

حمل الآن

مجاناً وحصرياً

المراجعة رقم (1)

اختبار شهر أكتوبر





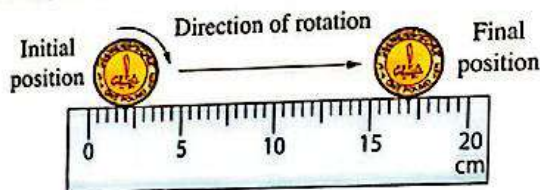
First

Multiple Choice Questions

Questions signed by * are answered in detail.

Physical measurements

- The fundamental physical quantities from the following are
 (a) the length and the area
 (b) the velocity and the acceleration
 (c) the mass and the volume
 (d) the time and the mass
- The derived physical quantities from the following are
 (a) velocity - distance - time
 (b) mass - density - volume
 (c) work - force - length
 (d) force - volume - density
- A common feature in the French (Gaussian) system, the British system and the Metric system is that they all measure
 (a) length in meters
 (b) mass in pounds
 (c) time in seconds
 (d) mass in grams
- * In the following figure, a metallic coin rolls over a graduated ruler with a certain scale completing two rotations, so the circumference of the coin equals



- The most accurate instrument for measuring the fall time of a body from the top of a building is



(a)



(b)



(c)

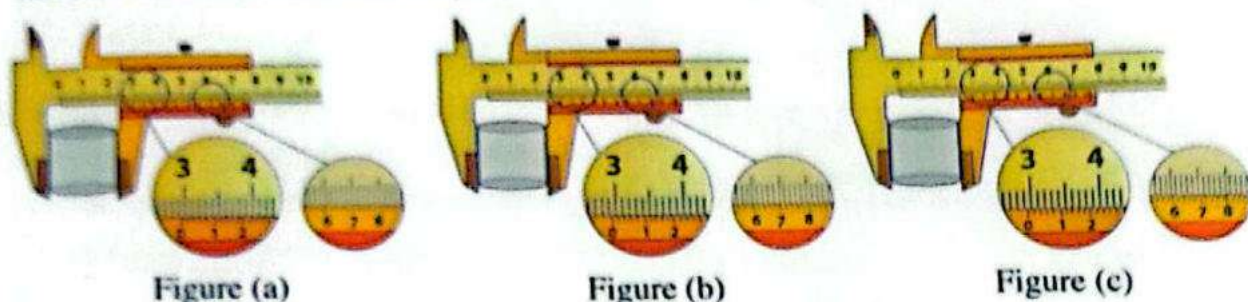


(d)

- 6 The suitable tool for measuring the mass of a golden ring is



- 7 Three metallic cylinders have different external diameters, a vernier caliper is used to measure the diameters of these cylinders as shown in the following figures:



In which of these figures, the diameter of the cylinder is 2.96 cm?

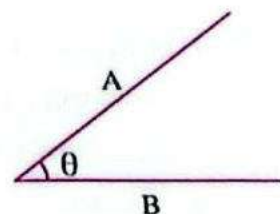
- (a) Figure (a). (b) Figure (b).
(c) Figure (c). (d) The three figures have equal diameters.

International system of units

- 8 From the opposite figure:

The measuring unit of the confined angle (θ) between the two sides A, B in the international system of units is

- (a) candela (b) radian
(c) steradian (d) meter



- 9 In which of the following choices do the length values increase from starting to ending?

- (a) 1 cm $\rightarrow$ 1 nm $\rightarrow$ 1 mm $\rightarrow$ 1 μ m (b) 1 μ m $\rightarrow$ 1 mm $\rightarrow$ 1 nm $\rightarrow$ 1 cm
(c) 1 nm $\rightarrow$ 1 μ m $\rightarrow$ 1 mm $\rightarrow$ 1 cm (d) 1 mm $\rightarrow$ 1 cm $\rightarrow$ 1 μ m $\rightarrow$ 1 nm

- 10 Femtosecond = microsecond

- (a) 10^{-15} (b) 10^{-9} (c) 10^9 (d) 10^6

- 11 If the radius of the hydrogen atom is 0.053 nm, then it is equivalent to

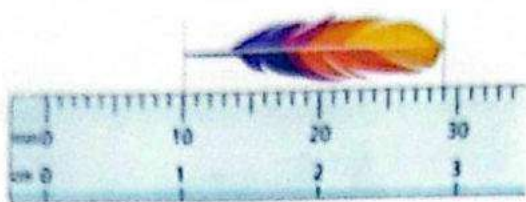
- (a) 0.53×10^{-10} m (b) 5.3×10^{-11} m (c) 53×10^{-12} m (d) all the previous

- 12 Which of the following values is equal to 86.2 mm?

- (a) 862×10^{10} μ m (b) 8.62×10^{-4} km (c) 0.862 Gm (d) 8.62 cm

- 13 If the volume of an amount of water equals 5 m^3 , then its volume in liters equals
- (a) 5 (b) 50 (c) 500 (d) 5000

- 14 In the following figure, a feather placed next to a ruler drawn with a certain scale, so the length of the feather is equal to



- (a) $19 \times 10^6 \text{ nm}$ (b) $29 \times 10^6 \text{ nm}$ (c) 1.9 mm (d) 2.9 mm
- 15 If $x = 10 \text{ g}$ and $y = 10 \text{ kg}$, then the value of $(x + y)$ is
- (a) 10.1 kg (b) 100.1 g (c) 10.01 kg (d) 10.01 g

- 16 The pyramid shown in the opposite figure contains about 2 million stones, the average mass of each stone is about 2.5 tons, then the mass of the pyramid approximately equals



- (a) $5 \times 10^9 \text{ kg}$ (b) $8 \times 10^9 \text{ kg}$
(c) $5 \times 10^{10} \text{ kg}$ (d) $8 \times 10^{10} \text{ kg}$
- 17 The Star of Africa diamond is the largest cut diamond in the world and it is kept in the tower of London. If the volume of this diamond is 30.2 cm^3 , then its volume in mm equals



- (a) 30.2×10^3 (b) 30.2×10^{-2}
(c) 30.2×10^{-6} (d) 30.2×10^{-9}
- 18 * How many bottles of volume 10000 cm^3 is enough to fill a tank of capacity 1 m^3 ?
- (a) 1 (b) 10 (c) 1000 (d) 100

- 19 A ball has radius 1.7 cm, so its surface area equals
(Knowing that: The surface area of the ball = $4\pi r^2$)

- (a) $2.1 \times 10^{-5} \text{ m}^2$ (b) $9.1 \times 10^{-4} \text{ m}^2$ (c) $3.6 \times 10^{-3} \text{ m}^2$ (d) 0.11 m^2
- 20 If the speed of water flow in a tube is 1.44 km.h^{-1} , it is equivalent to
- (a) 0.4 m.s^{-1} (b) 0.6 m.s^{-1} (c) 0.8 m.s^{-1} (d) 5.2 m.s^{-1}

Dimensional formula

- 21 If the measuring unit of a physical quantity is kg/m.s , then its dimensional formula is

(a) MLT (b) $\text{ML}^{-1}\text{T}^{-1}$ (c) ML^{-1}T^2 (d) MLT^2

- 22 * If the dimensional formula of density is ML^{-3}T^0 and its measuring unit is kg^x/m^y , then

(a) $x = 1, y = 2$ (b) $x = 2, y = -1$ (c) $x = 1, y = 3$ (d) $x = 1, y = -3$

- 23 The opposite table shows the measuring units of some physical quantities, so if the dimensional formula of a specific physical quantity is $\text{M}^x\text{L}^y\text{T}^{-2x}$ where x is an integer number, the quantity may be the

The physical quantity	The measuring unit
Force	kg.m/s^2
Acceleration	m/s^2
Density	kg/m^3
Velocity	m/s

(a) force
(b) acceleration
(c) density
(d) velocity

- 24 If the dimensional formula of quantity A is ML^2T^{-2} and the dimensional formula of quantity B is ML^2T^{-2} , then the quantity $(2B - A)$

(a) has a dimensional formula of ML^2T^{-2}
(b) has a dimensional formula of $\text{M}^2\text{L}^4\text{T}^{-4}$
(c) has a dimensional formula of $\text{M}^3\text{L}^6\text{T}^{-6}$
(d) isn't a physical quantity

- 25 If the dimensional formula of both quantities x and y is LT^{-1} and the dimensional formula of quantity z is LT^{-2} , then the dimensional formula of the quantity k that verifies the equation: $x = y + zk$ is

(a) LT (b) LT^{-1} (c) L (d) T

- 26 If F is the force that acts on a static body of mass m to reach a speed v through time t , then the two physical quantities mv and Ft have
(Knowing that: $[F] = \text{MLT}^{-2}$, $[v] = \text{LT}^{-1}$)

(a) different dimensions (b) the same dimensions
(c) different measuring units (d) no meaning

- 27 The relative speed of a train moving at speed v_1 when the driver of another train moving in the opposite direction at speed v_2 observes it equals $(v_1 + v_2)$ while the relative density of a liquid equals the ratio between the density of the liquid and the density of water, then

	Relative speed	Relative density
(a)	has no dimensions	has no dimensions
(b)	has no dimensions	has dimensions
(c)	has dimensions	has no dimensions
(d)	has dimensions	has dimensions

- 28 * If the equation $x = At^2 + Bt$ describes the motion of a body and the quantity x has the length dimension and the quantity t has the time dimension, then the dimensions of each of the quantities A and B are,

	[A]	[B]
(a)	LT^2	LT
(b)	LT^2	LT^{-1}
(c)	LT^{-2}	LT^{-1}
(d)	LT^{-2}	LT

- 29 In an experiment to find the speed of sound (v) in air by using closed tubes, if you know that the relation between the frequency (f) of the sound wave in the tube and the length of the tube is $f = \frac{1}{4} v l^n$ by neglecting the effect of the radius of the tube, so the value of the constant (n) using the dimensional formula knowing that the frequency is measured in hertz ($\text{Hz} = \text{s}^{-1}$) is equal to

- (a) 1 (b) -1 (c) 2 (d) -2

► Error in measurements and types of measurement

- 30 From the examples of a direct measurement, measuring the

- (a) mass of a body by a balance
 (b) area of a room by a meter tape
 (c) volume of a cuboid by measuring the length, the width and the height
 (d) density of a liquid by measuring its mass and its volume

31 From the examples of an indirect measurement, measuring the

- (a) density of a liquid by a hydrometer
- (b) height of a person by a meter tape
- (c) mass of a body by a balance
- (d) volume of a cube by measuring its length

32 The measurement process shown in the opposite figure is considered as a/an measurement.

- (a) complex
- (b) complicated
- (c) direct
- (d) indirect



33 The opposite figure shows an ammeter when there is no electric current passing through it, then which of the following figures describes this ammeter when a current of intensity 3 A passes through it?



(a)



(b)

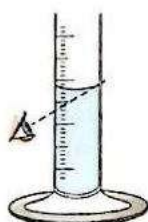


(c)

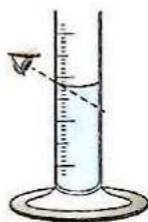


(d)

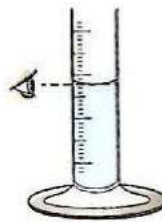
34 Which of the following procedures is the right procedure to look at the scale of a graduated cylinder to measure the volume of the water?



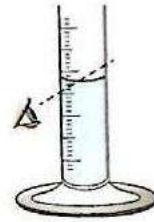
(a)



(b)



(c)



(d)

35 When measuring the current intensity in an electric circuit, the intensity was expected to be 2.5 A, so which of the following ammeters is the most appropriate for measuring the current accurately?



(a)



(b)



(c)



(d)

1 Is the physical quantity that is measured by $\text{kg} \cdot \text{m}^{-3}$ fundamental or derived quantity? And why?

2 Arrange in a descending order the following masses:

(1) 15 g

(2) 0.032 kg

(3) $2.7 \times 10^5 \text{ mg}$

(4) $4.1 \times 10^{-8} \text{ Gg}$

(5) $2.7 \times 10^8 \mu\text{g}$

3 What is the importance of using (platinum-iridium) alloy in the standard meter?

4 Is the following statement valid? Explain your answer.

"The dimensional formula is used to prove that a rule is incorrect, but it is not enough to prove that the rule is correct".

5 Einstein states his famous equation: $E = mc^2$, where (c) is the speed of light, (m) is the mass of the particle and (E) is the energy. Use this equation to deduce the international system of units for measuring the energy of a particle (E).

6 Deduce the dimensions of each of the following:

(1) Force (F).

(2) Pressure (P).

(3) Work (W).

(Knowing that: Force (F) = mass (m) $\times$ acceleration (a), Pressure (P) = $\frac{\text{force (F)}}{\text{area (A)}}$, Work (W) = force (F) $\times$ displacement (d) and $[a] = \text{L T}^{-2}$)

7 Use the dimensional formula to check the possibility of the following laws:

(1) Work (W) = $\frac{1}{2} mv^2$

(2) Volume of a sphere (V_{ol}) = $\frac{4}{3} \pi r^3$

(3) Force (F) = $\frac{m}{V_{\text{ol}}}$

(4) Area of a square (A) = ℓ^3

(Where: (v) is the body speed, (m) is the body mass, (r) is the sphere radius, (ℓ) is the length of the square, and (V_{ol}) is the volume)

8 State the precautions considered when using:

(1) The metric ruler to measure the length of an object.

(2) The sensitive balance.

9 When students were measuring the mass of a piece of iron in the Physics lab, the teacher asked them to repeat the measuring process several times and calculate the average. What is the purpose of the teacher's demand?

Choose the correct answer:

- 1 If the radius of Saturn is 5.85×10^7 m and its mass is 5.68×10^{26} kg, the average density of Saturn materials equals

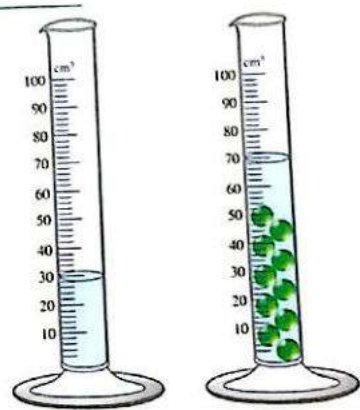
(Knowing that: The volume of a sphere = $\frac{4}{3} \pi r^3$, the surface area of a sphere = $4 \pi r^2$, $\pi = \frac{22}{7}$ and (r) is the radius of the sphere)

- (a) 2.3×10^{15} g/cm³ (b) 6.77×10^{-5} g/cm³ (c) 6.77×10^2 g/cm³ (d) 0.677 g/cm³

- 2 The opposite figure shows two identical cylinders (1) and (2), cylinder (1) contains a certain quantity of water and cylinder (2) contains the same quantity of water and ten identical solid glass marbles, the mass of each marble is 10 g, then the density of the glass of which these marbles are made is

(Given that: Density = $\frac{\text{Mass}}{\text{Volume}}$)

- (a) 25×10^3 kg/m³ (b) 4×10^2 kg/m³
(c) 25×10^2 kg/m³ (d) 4×10^3 kg/m³



Cylinder (1)

Cylinder (2)

- 3 The measuring unit of the physical quantity that has a dimensional formula of MLT^{-1} is

(Knowing that: The newton (N) is equivalent to $kg \cdot m \cdot s^{-2}$, the joule (J) is equivalent to $kg \cdot m^2 \cdot s^{-2}$)

- (a) N.m (b) $J \cdot m^{-1}$ (c) N.s (d) $J \cdot s^{-1}$

- 4 By using the opposite table:

What is the measuring unit of the quantity that equals the product of the gas pressure and its volume?

(Knowing that: The pressure is measured in pascal)

- (a) Newton (b) Watt
(c) Newton.second (d) Joule

Measuring unit	Equivalent unit
Newton (N)	$kg \cdot m \cdot s^{-2}$
Pascal (Pa)	N/m^2
Joule (J)	N.m
Watt (W)	J/s

- 5 If Newton's universal law of gravitation is given by the relation; $F = \frac{GMm}{r^2}$, where F is the attraction force between two bodies of masses M and m and the distance between their centers is r , then the measuring unit of the universal gravitational constant (G) in terms of the international system of units is (Knowing that: $[F] = MLT^{-2}$)

(a) $kg \cdot m^3 \cdot s^{-2}$ (b) $kg^{-1} \cdot m^{-3} \cdot s^{-2}$ (c) $kg^{-1} \cdot m^3 \cdot s^{-2}$ (d) $kg \cdot m^{-3} \cdot s^{-2}$

- 6 If the tension force in one of the strings of a musical instrument is F_T and the mass per unit length of the string is μ and the speed of the moving wave in this string is v , so which of the following equations may be correct?

(Knowing that: $[F_T] = MLT^{-2}$, $[v] = LT^{-1}$)

(a) $v = \frac{F_T}{\sqrt{\mu}}$ (b) $v = F_T^2 \mu$ (c) $v = \sqrt{\frac{F_T}{\mu}}$ (d) $v = F_T \mu^2$

- 7 The opposite table shows the dimensions of the physical quantities x , y , z and k .

The physical quantity	x	y	z	k
Dimensional formula	MLT^{-2}	LT^{-2}	M	MLT^{-2}

Which of the following equations may be correct?

(a) $x = y + z + k$ (b) $x = y + z k$ (c) $x = y z k$ (d) $x = y z + k$

Answer the following question:

- 8 The dimensional formula of both quantities X and Y is LT^{-1} , the dimensional formula of quantity Z is LT^{-2} and the dimensional formula of quantity K is L .

Use the previous quantities to form a possible relation.

First

Multiple Choice Questions

Questions signed by * are answered in detail.

Interactive
test



- 1 Which of the following figures represents a translational motion?



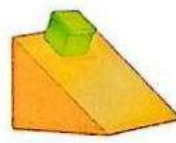
(a)



(b)



(c)



(d)

- 2 The motion of the Moon in its path around the Earth when it is observed during a whole night is considered motion in a

- (a) periodic, straight line (b) vibrational, curved path
(c) translational, straight line (d) translational, curved path

- 3 A leopard was chasing a prey, if it moved in a straight line by a uniform velocity of 10 m/s during 15 s, then its displacement is

- (a) 25 m (b) 150 m (c) 1.5 m (d) 200 m

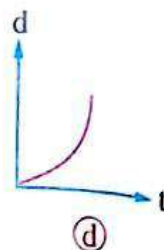
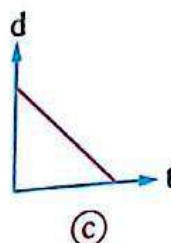
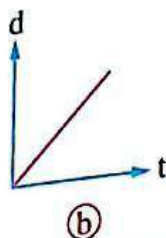
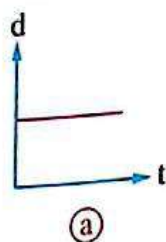
- 4 * A car was moving in a straight road to Hurghada so that it passed by the (170 km) sign at 8:00 am and by the (5 km) sign at 10:00 am, so the average velocity by which the car was moving equals

- (a) 64.96 m/s (b) 43.8 m/s (c) 32.4 m/s (d) 22.9 m/s

- 5 * If the distance between the Sun and the Earth is 1496×10^5 km and the speed of light in the space is 3×10^5 km/s, so the time required for the sunlight to reach the Earth equals

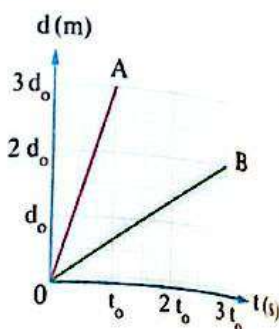
- (a) 498.67×10^3 s (b) 997.33 s (c) 498.67 s (d) 249.33 s

- 6 Which of the following graphs of displacement versus time describes a body moving with non-uniform velocity in a straight line?



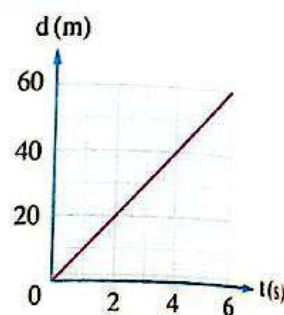
- 7 * The opposite graph represents the relation between the displacement (d) and time (t) of two bodies A and B that are moving in a straight line, so the ratio between their velocities ($\frac{v_A}{v_B}$) equals

- (a) $\frac{9}{2}$ (b) $\frac{9}{4}$
(c) $\frac{3}{2}$ (d) $\frac{4}{3}$



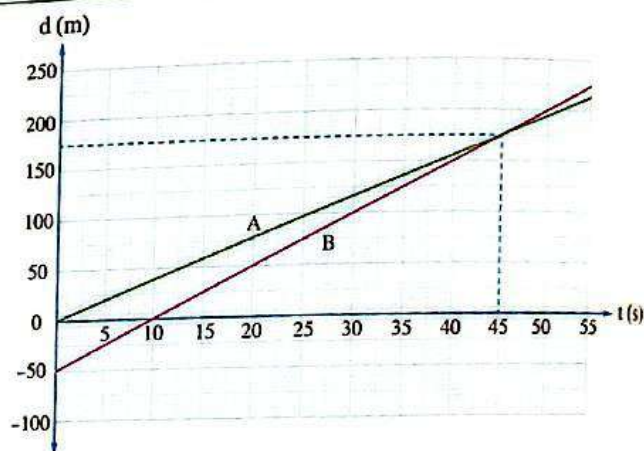
- 8 The opposite graph of displacement (d) versus time (t) describes the motion of a body which is moving with a

- (a) non-uniform velocity whose average is 10 m/s
(b) non-uniform velocity whose average is 40 m/s
(c) uniform velocity of 10 m/s
(d) uniform velocity of 40 m/s

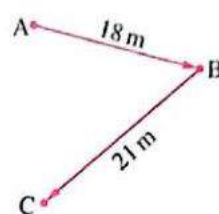


- 9 The opposite graph represents the change of the positions of two runners A and B who move in a straight track in the same direction with the time. At the moment runner B passes runner A,

- (a) the displacement and velocity of runner B are equal to displacement and the velocity of runner A
(b) the displacement and velocity of runner B are greater than the displacement and velocity of runner A
(c) the displacement and velocity of runner B are less than the displacement and velocity of runner A
(d) the displacement of runner B is greater than the displacement of runner A, while the velocity of runner B is equal to the velocity of runner A



- 10 The opposite figure shows the path of a football that was kicked between three players on a playground, if the ball moves from player A to player B in 1.2 s, then:



- (i) The magnitude of the average velocity of the ball between A and B equals

(a) 25.2 m/s (b) 21.6 m/s (c) 17.5 m/s (d) 15 m/s

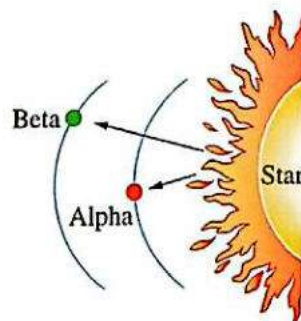
- (ii) The time required for the ball to move from B to C with the same magnitude of the average velocity that was calculated in (i) equals

(a) 1.4 s (b) 1.2 s (c) 0.83 s (d) 0.71 s

- 11 * A man is running in a rectangular path of dimensions 50 m and 40 m. If he completes one revolution in a time of 100 s, then his average velocity equals

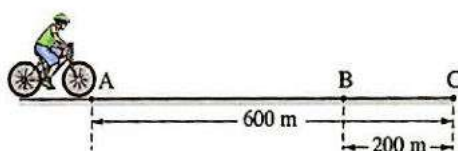
(a) 9 m/s (b) 1.8 m/s (c) 0.9 m/s (d) 0

- 12 In the opposite figure, light travels from the star to planet Alpha in fifteen minutes and travels from the star to planet Beta in one hour. If the speed of light in the space is 3×10^8 m/s, then the distance between the orbits of the two planets equals



(a) 81×10^{20} m (b) 81×10^{10} m
(c) 48×10^8 m (d) 48×10^{11} m

- 13 * The opposite figure shows a bike that starts its motion from rest at point A to reach point C after 80 s, then it returns back in the opposite direction to reach point B after 20 s, so the magnitude of the average velocity of the bike in each of the following intervals is



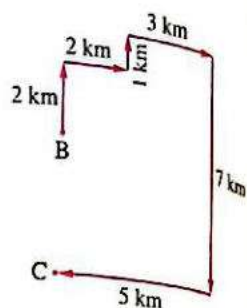
	From $t = 0$ to $t = 80$ s	Through the whole journey
(a)	8 m/s	8 m/s
(b)	8 m/s	4 m/s
(c)	7.5 m/s	8 m/s
(d)	7.5 m/s	4 m/s

- 14 * In a football match, the ball was 50 m away from a player who was running towards it at uniform velocity of 3 m/s, meanwhile another player was at 35 m from the ball and ran at uniform velocity of 2 m/s towards the ball, so the first player reaches the ball

- (a) before the second player by a time of 0.83 s
 (b) before the second player by a time of 0.55 s
 (c) after the second player by a time of 0.83 s
 (d) after the second player by a time of 0.55 s

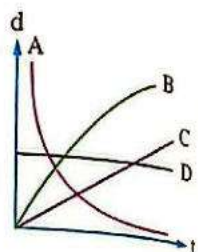
- 15 The opposite figure shows the path of a body that starts its motion from point B and takes 4 h to cover the shown path, then the average velocity of the body equals

- (a) 1.25 km/h in the north direction
 (b) 1.25 km/h in the south direction
 (c) 1 km/h in the north direction
 (d) 1 km/h in the south direction



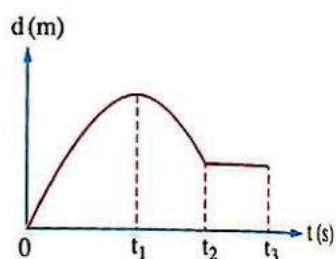
- 16 The opposite graph describes the displacement (d) of four students (A, B, C, D) relative to their school with respect to time (t), so which student was initially moving fast towards the school then slowed down?

- (a) Student A (b) Student B
 (c) Student C (d) Student D



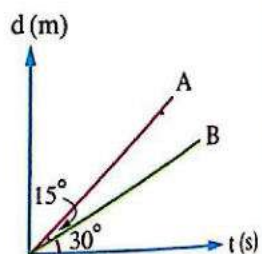
- 17 * The opposite (displacement-time) graph represents the motion of a body in a straight line, hence the time interval at which the velocity is negative is between

- (a) 0, t_1 (b) t_1, t_2
 (c) t_2, t_3 (d) 0, t_3

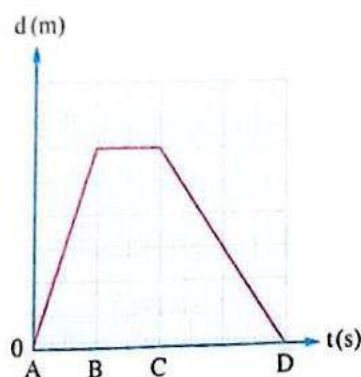


- 18 * The opposite graph shows the relation between the displacement and time for two bodies A and B that start their motion from rest in a straight line, so the ratio between their velocities ($\frac{v_A}{v_B}$) is

- (a) 0.46 (b) 2.15
 (c) $\sqrt{3}$ (d) $\sqrt{2}$



- 19 The opposite (displacement-time) graph represents the motion of a girl that rides a bicycle in a straight road, then:



(i) The velocity of the girl during the interval AB is

- (a) positive and uniform
(b) negative and uniform
(c) non-uniform
(d) equal to zero

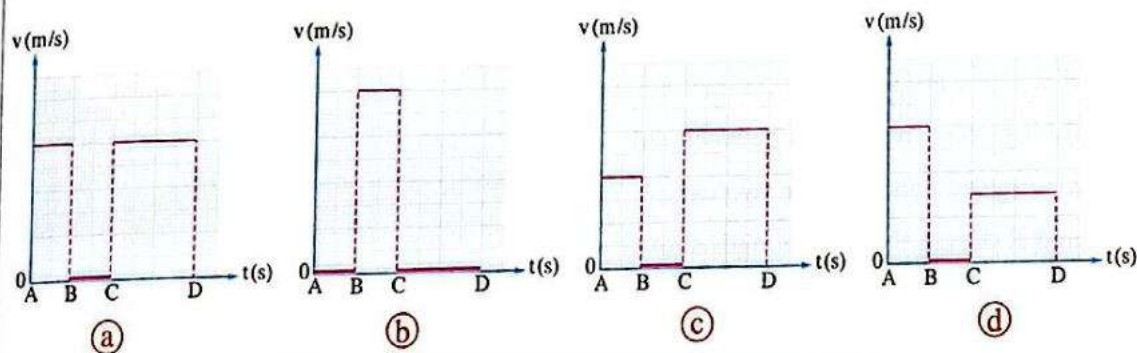
(ii) The velocity of the girl during the interval BC is

- (a) positive and uniform (b) negative and uniform
(c) non-uniform (d) equal to zero

(iii) The velocity of the girl during the interval CD is

- (a) positive and uniform (b) negative and uniform
(c) non-uniform (d) equal to zero

(iv) Which of the following graphs represents the relation between the magnitude of the girl's velocity during the intervals AB, BC and CD with the time?



- 20 * The opposite graph represents the change of the displacement of a body that moves in a straight line versus the time, then:

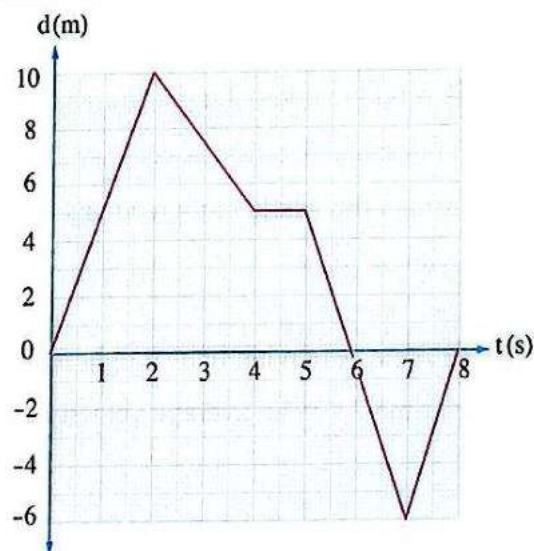
(i) The average velocity of the body during the following intervals:

① from $t = 0$ to $t = 2$ s equals

- (a) 5 m/s (b) 4 m/s
(c) 3 m/s (d) 2 m/s

② from $t = 0$ to $t = 4$ s equals

- (a) 1.5 m/s (b) 1.25 m/s
(c) 0.75 m/s (d) 0.5 m/s



③ from $t = 4 \text{ s}$ to $t = 7 \text{ s}$ equals

- (a) -3 m/s (b) 3.33 m/s (c) -3.67 m/s (d) 4.33 m/s

④ from $t = 0$ to $t = 8 \text{ s}$ equals

- (a) 0.5 m/s (b) 0.75 m/s (c) -0.25 m/s (d) 0

(ii) The instantaneous velocity of the body at:

① $t = 1 \text{ s}$ equals

- (a) 1 m/s (b) 2 m/s (c) 3 m/s (d) 5 m/s

② $t = 3 \text{ s}$ equals

- (a) -2.5 m/s (b) -5 m/s (c) 2.5 m/s (d) 5 m/s

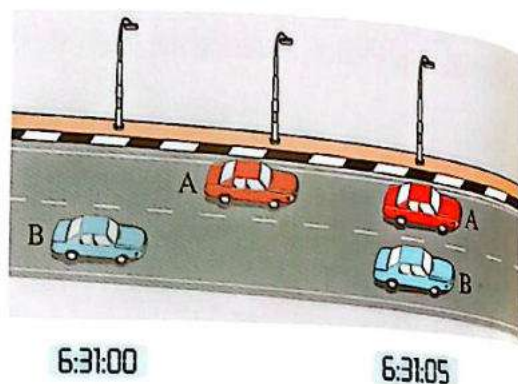
③ $t = 4.5 \text{ s}$ equals

- (a) 2 m/s (b) 1 m/s (c) 0 (d) -0.5 m/s

④ $t = 7.5 \text{ s}$ equals

- (a) 3 m/s (b) 6 m/s (c) -3 m/s (d) -6 m/s

- 21 The distance between each two successive light poles in a desert road is 70 m and the opposite figure shows the change in position of two cars A, B which were travelling on the road through 5 s , so the ratio between the average velocities of the two cars A and B during the five seconds shown in the figure $\left(\frac{v_A}{v_B}\right)$ equals



- (a) $\frac{1}{1}$ (b) $\frac{1}{2}$ (c) $\frac{2}{1}$ (d) $\frac{1}{4}$

- 22 * A body moves along a straight line at velocity v to cover a distance d , then it moves in the same direction at velocity $2v$ to cover a distance $4d$, so its average velocity through the whole motion equals

- (a) v (b) $\frac{3}{2}v$ (c) $2v$ (d) $\frac{5}{3}v$

- 23 * A car is moving in a straight road for time t by an average velocity v , then it moves for time $2t$ by an average velocity $2v$, so its average velocity through the whole motion is

- (a) v (b) $2v$ (c) $\frac{3}{2}v$ (d) $\frac{5}{3}v$

- 24 * A car was moving in a straight road of length 320 km, it covered 240 km with an average velocity of 75 km/h, then it ran out of fuel and stopped for 0.6 h until it was refueled and completed its journey with a velocity of 100 km/h until it reaches the end of the journey. So, the average velocity of the car during the whole journey was

(a) 69.57 km/h (b) 80 km/h (c) 87.57 km/h (d) 95 km/h

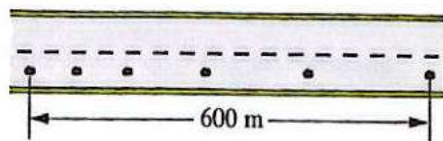
- 25 A car spent three hours during its trip in a straight line. If its average velocity during the first hour was 90 km/h and its average velocity during the last two hours was v and its average velocity during the whole trip was 75 km/h, therefore the value of v equals

(a) 2.5 km/h (b) 67.5 km/h (c) 135 km/h (d) 157.5 km/h

- 26 * A body moves in a straight line for one minute with a velocity of 10 m/s then it moves for another minute with a velocity of 20 m/s, so the average velocity of the body equals

(a) 15 m/s (b) 13 m/s (c) 7.5 m/s (d) 5 m/s

- 27 * A car is moving in a straight horizontal road where its engine leaks an oil drop every 5 s on the road as shown in the opposite figure, then the average velocity of the car during the distance shown in the figure equals



(a) 120 m/s (b) 60 m/s (c) 24 m/s (d) 12 m/s

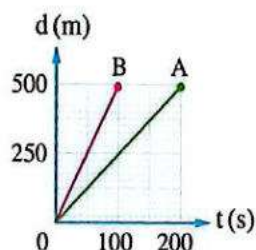
Second Essay Questions

- 1 If the average velocity of a body during a certain time interval equals zero. What can you deduce about the displacement of the body during this interval?

- 2 In the opposite figure:

Two objects (A) and (B) have moved from rest in a straight line.

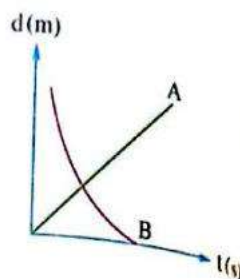
Which object has been faster? And why?



- 3 The opposite graph represents the change in displacement of two objects (A) and (B) relative to a building with time.

- (a) Which of them is moving away from the building and which is getting closer to the building?
- (b) Which of them is moving at uniform velocity and which is moving at non-uniform velocity?

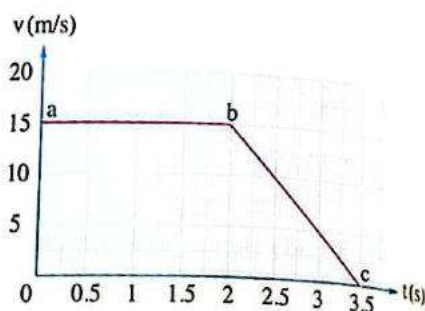
Explain your answer.



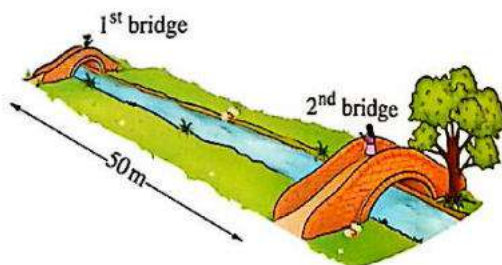
- 4 A car was moving in a straight road, at $t = 0$ the driver saw a barrier on the road, so he pressed the brakes. The opposite graph represents the relation between the velocity of the car and the time:

- (a) Describe the velocity of the car during the intervals ab and bc.

- (b) Calculate the displacement covered by the car from $t = 0$ to $t = 3.5$ s.



- 5 The opposite figure shows two girls trying to measure the speed of the river's water stream. The girl who stands on the first bridge drops a piece of wood in the water and the girl who stands on the second bridge measures the time (t) taken by the piece of wood to reach the second bridge:

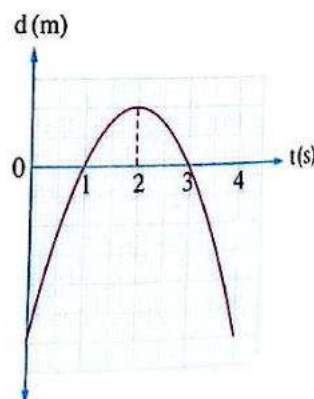


- (a) Mention the suitable tools that can be used by the girls to measure the distance between the two bridges and also the time (t).
- (b) If the time taken by the wooden piece to cover the distance between the two bridges is 400 s, calculate the average speed of the river's water stream.

- 6 The opposite (displacement-time) graph describes the motion of a body in a straight line.

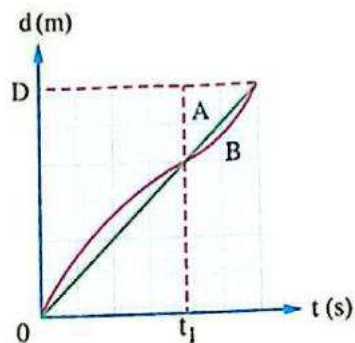
Is the velocity of the body positive, negative or zero at:

- (a) $t = 1$ s
- (b) $t = 2$ s
- (c) $t = 3$ s



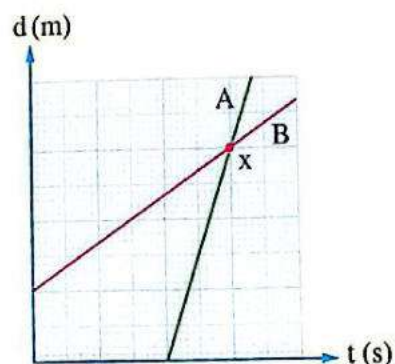
Choose the correct answer:

- 1 The opposite graph shows the relation between the displacement (d) and the time (t) of two cars A and B that start a race of length D at $t = 0$ and move in a straight line. Which of the following statements is **wrong**?



- (a) Car A moves with a uniform velocity while car B moves with non-uniform velocity.
- (b) Car A reaches the end of the race first.
- (c) At time t_1 , the average velocity of car A equals the average velocity of car B.
- (d) The two cars cover the same displacement after time t_1

- 2 The opposite graph of displacement (d) versus time (t) describes the motion of two boys A and B moving at a uniform velocity in a straight line. Which of the following sentences is right?



- (a) B starts his motion after A.
- (b) The velocities of A and B are equal at point x.
- (c) The velocity of A is less than that of B.
- (d) A precedes B after passing point x.

- 3 If a car is moving in a straight road in one direction to cover one third of the distance at velocity of 25 km/h and the rest of the distance at velocity of 75 km/h, so the average velocity of the car is

- (a) 30 km/h
- (b) 45 km/h
- (c) 50 km/h
- (d) 65 km/h

- 4 Two boys A and B were running in a straight line towards each other. If at a given instant they were at two points x, y respectively where the distance between them was 135 m, the velocity of boy A was 6.75 m/s and the velocity of boy B was 5.25 m/s, then when they meet,

	The distance between boy A and point (x)	The distance between boy B and point (y)
(a)	75.94 m	59.06 m
(b)	75.94 m	240 m
(c)	308.6 m	59.06 m
(d)	308.6 m	240 m



First

Multiple Choice Questions

Questions signed by * are answered in detail.

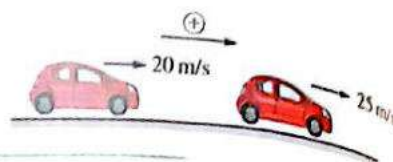
- 1 If a body starts its motion from rest and moves by acceleration a to reach a velocity v_f after time t , so its final velocity v_f can be represented by the relation;
 (a) $v_f = \frac{a}{t}$ (b) $v_f = at$ (c) $v_f = \frac{1}{2} at^2$ (d) $v_f = \sqrt{at}$
- 2 A body has moved with an acceleration of 4 m/s^2 for an interval of 2 s. The magnitude of the change in the body's velocity during that interval is equal to
 (a) 6 m/s (b) 8 m/s (c) 10 m/s (d) 12 m/s
- 3 A body is moving with a uniform velocity of 5 m/s for 5 s, then its acceleration equals
 (a) 5 m/s^2 (b) 1 m/s^2 (c) zero (d) -5 m/s^2
- 4 If an object starts motion from rest and speeds up at a constant rate till its velocity becomes 50 m/s during 10 s, this object moves at an acceleration of
 (a) $\frac{1}{5} \text{ m/s}^2$ (b) 5 m/s^2 (c) 40 m/s^2 (d) 60 m/s^2
- 5 * When the brakes of a car that was moving at a velocity of 20 m/s were applied, the velocity of the car changed uniformly with time until it stopped through 8 s from the moment of applying the brakes and the opposite figure shows the position (x) of the car from the moment of applying the brakes until it stopped. If the direction of motion of the car is the positive direction of motion, then during this interval the average velocity of the car and its acceleration of motion are

$t \text{ (s)}$	0	2	4	6	8
$x \text{ (m)}$	0	35	60	75	80

 (a) $2 \text{ m/s}, -1.5 \text{ m/s}^2$ (b) $2 \text{ m/s}, -2.5 \text{ m/s}^2$
 (c) $10 \text{ m/s}, 2.5 \text{ m/s}^2$ (d) $10 \text{ m/s}, -2.5 \text{ m/s}^2$
- 6 When a body moves to the north with a uniform acceleration in the north direction, so its
 (a) initial velocity > its final velocity (b) initial velocity < its final velocity
 (c) initial velocity = its final velocity (d) velocity has variable direction

7 In the opposite figure, the car moves by

- (a) positive acceleration (b) negative acceleration
(c) uniform velocity (d) decreasing velocity



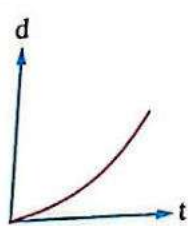
8 When the object's acceleration is in the opposite direction to its velocity, its

- (a) instantaneous velocity always equals its average velocity
(b) velocity increases with time (c) velocity decreases with time
(d) velocity doesn't change with time

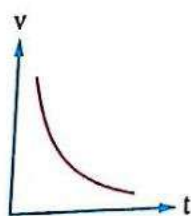
9 If both the directions of velocity and acceleration are negative,

- (a) the velocity of the object increases (b) the velocity of the object decreases
(c) the velocity of object is constant (d) the object stops

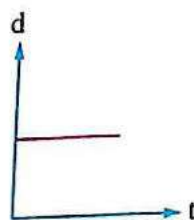
10 The following graphs describe a body moving with an acceleration except



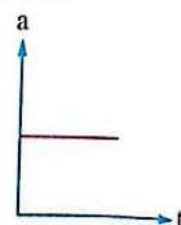
(a)



(b)



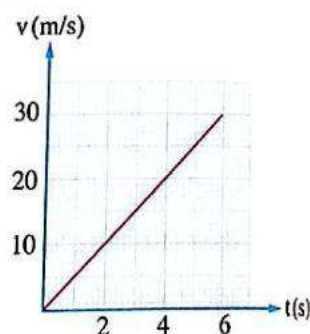
(c)



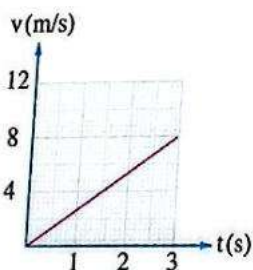
(d)

11 The opposite graph shows the relation between the body's velocity (v) and the time (t), then the body moves by

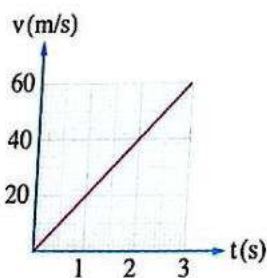
- (a) uniform acceleration of 10 m/s^2
(b) uniform acceleration of -5 m/s^2
(c) uniform acceleration of 5 m/s^2
(d) non-uniform acceleration of average -10 m/s^2



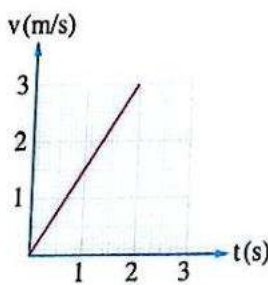
12 The following graphs describe objects moving with uniform acceleration, which object of them has the largest acceleration?



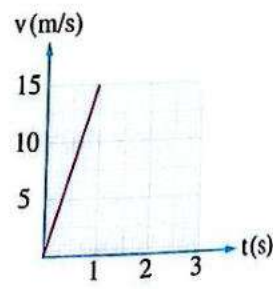
(a)



(b)



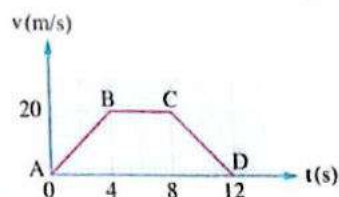
(c)



(d)

- 13 The opposite (velocity-time) graph represents the motion of a body in a straight line, then:

(i) The type of the body's acceleration during the interval



	AB	BC	CD
(a)	positive	positive	positive
(b)	positive	positive	negative
(c)	positive	zero	negative
(d)	negative	zero	positive

(ii) The acceleration by which the body moves from A to B equals

- (a) 0 (b) 1.6 m/s^2 (c) 2.5 m/s^2 (d) 5 m/s^2

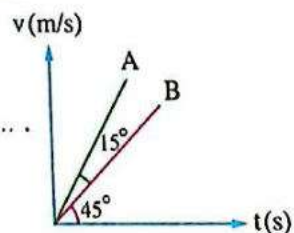
(iii) The acceleration by which the body moves from C to D equals

- (a) -5 m/s^2 (b) -4 m/s^2 (c) -2.5 m/s^2 (d) -1.6 m/s^2

(iv) The distance covered by the body during its motion from B to C equals

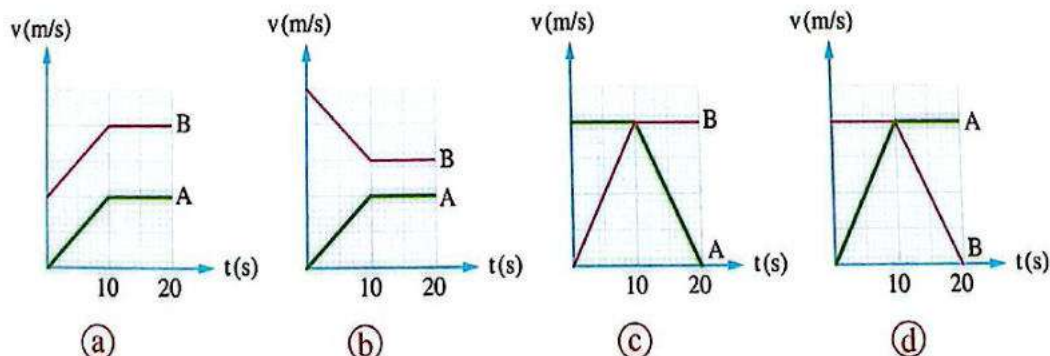
- (a) 80 m (b) 120 m (c) 160 m (d) 240 m

- 14 The opposite graph shows the relation between velocity (v) and time (t) of two bodies A and B that start their motion from rest, so the ratio between the accelerations of the bodies ($\frac{a_A}{a_B}$) is

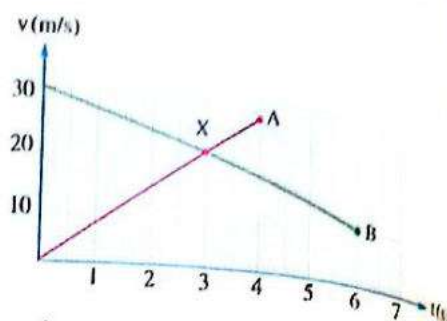


- (a) $\frac{4}{3}$ (b) $\frac{1}{3}$
(c) $\frac{\sqrt{3}}{1}$ (d) $\frac{\sqrt{2}}{1}$

- 15 * Car A started its motion from rest with uniform acceleration of 1 m/s^2 in the first 10 s of the journey, while car B was moving with constant velocity of 10 m/s in the same time interval. In the next 10 s, car A moved with constant velocity of 10 m/s, while car B was decelerating uniformly by 1 m/s^2 . So, the graph that represents the relation between the velocity and the time of the two cars is

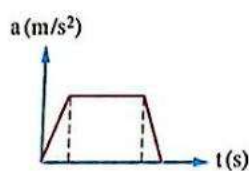
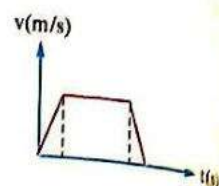


- 16 * The opposite graph represents the relation between the velocity of two objects A, B and the time, so which of the following sentences is correct?

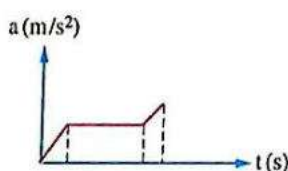


- (a) A and B move in opposite directions from $t = 0$ to $t = 3$ s.
- (b) The accelerations of A and B have the same direction.
- (c) The magnitude of the acceleration of A is larger than that of B.
- (d) The two objects have equal displacements through the first 3 s.

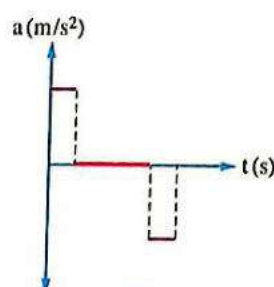
- 17 The opposite (velocity-time) graph describes the motion of a car, so the (acceleration-time) graph that represents the motion of the car is



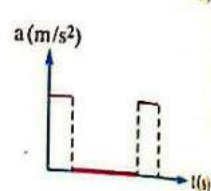
(a)



(b)



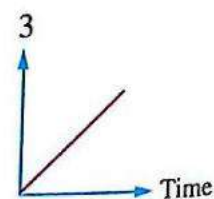
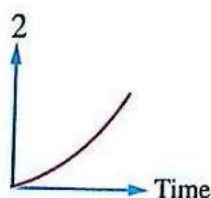
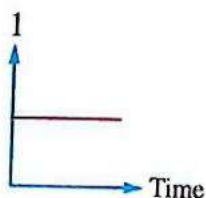
(c)



(d)

Second Essay Questions

- 1 If the acceleration of an object equals zero, **does this mean that its velocity must equal zero?** Explain your answer.
- 2 Is it possible for the velocity of a car to be in the north direction when the car is moving at the same time by an acceleration in the south direction? **Discuss your answer.**
- 3 A bus is moving with uniform acceleration, where the following graphs represent the relation between the time on the horizontal axis and each of (1), (2) and (3) on the vertical axis:

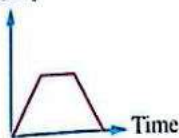


What are the physical quantities that are represented by the numbers (1), (2) and (3)?

- 4 You have four ticker-tapes that describe the motion of objects. Match each ticker-tape with the proper graph that represents the same motion.



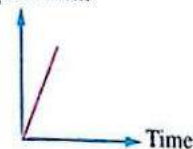
Velocity



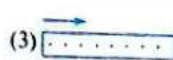
(a)



Displacement



(b)



Velocity



(c)



Displacement



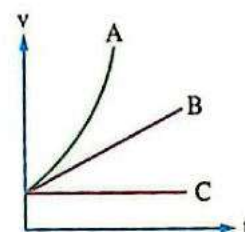
(d)

Questions that measure high levels of thinking

Answered in detail

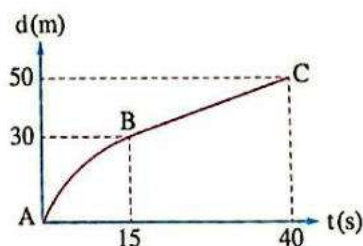
Choose the correct answer:

- 1 The opposite graph represents the relation between the velocity (v) and the time (t) for three bodies A, B and C, so for which of these bodies the acceleration increases with time?



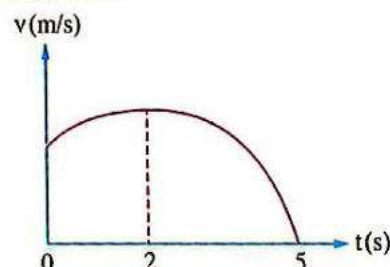
- (a) Body A
(b) Body B
(c) Body C
(d) Both A and B

- 2 The opposite graph represents the relation between the displacement (d) and the time (t) for a body that moves in a straight line, then the accelerations by which the body moves during the intervals AB and BC are,



	AB	BC
(a)	negative	positive
(b)	negative	zero
(c)	positive	positive
(d)	positive	zero

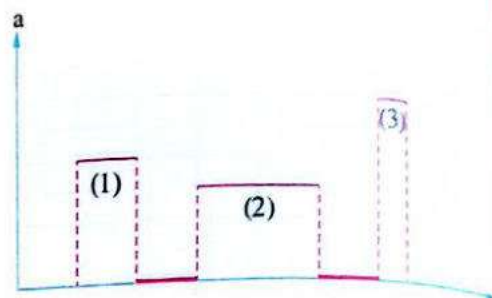
- 3 The opposite (velocity-time) graph represents the motion of a car in a straight road, so which of the following sentences is correct?



- (a) The car is static at $t = 0$.
(b) The car returns to its starting point during 5 s.
(c) The displacement of the car increases from $t = 0$ to $t = 5$ s.
(d) The acceleration of the car is maximum at $t = 2$ s.

- 4 The opposite graph represents the relation between the acceleration (a) and the time (t) for a body that moves in a straight line, so the correct arrangement of the intervals (1), (2), (3) according to the magnitude of the change in the velocity of the body during each of them is

- (a) $2 < 1 < 3$ (b) $1 < 2 < 3$
(c) $3 < 1 < 2$ (d) $3 < 2 < 1$



Questions ?

Chapter 3

Answered

Force and Motion

Interactive
test



First

Multiple Choice Questions

Questions signed by * are answered in detail.

Newton's first law

- 1 The continuity of rotation of the blades of the electric fan for a period of time although the electric current is turned off is due to
 - (a) inertia
 - (b) the heavy mass of the fan blades
 - (c) the stored amount of electric current
 - (d) the equilibrium of the acting forces
- 2 The body is in equilibrium when
 - (a) the resultant of the forces that acts on it equals zero
 - (b) it is static
 - (c) it is moving with constant velocity in a straight line
 - (d) all the previous
- 3 A bus was stopping at a traffic sign when another bus hit it rapidly from the back, so which of the following figures describes the motion of the passengers inside the two buses during the collision?
 - (a)
 - (b)
 - (c)
 - (d)



(a)



(b)



(c)



(d)

- 4 A person tried to push a box of mass 50 kg that is placed on a rough horizontal surface as in the opposite figure but he couldn't, so the resultant of the acting force on the box equals

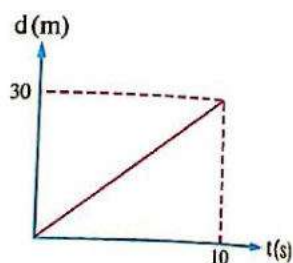


- (a) zero (b) 25 N
(c) 50 N (d) 500 N

- 5 A car is moving on a horizontal road with a uniform velocity of 10 m/s and it is affected by frictional forces of 1500 N, so the force by which the engine acts on the car is

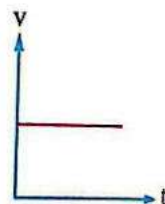
- (a) 150 N (b) 1500 N (c) 15000 N (d) 0

- 6 * The opposite graph represents the relation between the displacement (d) and the time (t) of a body of mass 10 kg that moves in a straight line, so the acting resultant force on the body equals



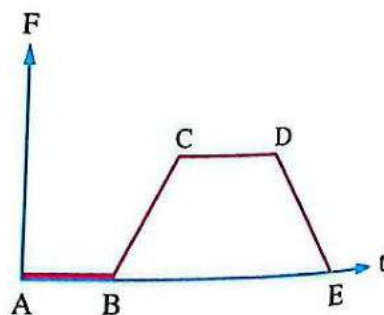
- (a) 30 N (b) 300 N
(c) 3 N (d) 0

- 7 * The opposite graph represents the relation between the velocity (v) and the time (t) of a body that is affected by three forces F_1 , F_2 and F_3 where the direction of each F_1 and F_2 is opposite to the direction of F_3 , so which of the following equations is correct?



- (a) $F_3 = F_1 + F_2$ (b) $F_1 = F_2 = F_3$
(c) $F_1 = F_2 + F_3$ (d) $F_2 = F_1 + F_3$

- 8 * The opposite graph represents the relation between the resultant force (F) acting on a moving body and the time (t), so the time interval in which the body moves with uniform velocity is



- (a) AB (b) BC
(c) CD (d) DE

Momentum

- 9 The product of the mass of a body that is moving in a constant direction and the time rate of change in its displacement represents the

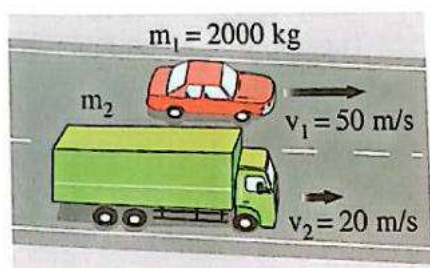
(a) net force acting on the body
(b) momentum of the body
(c) acceleration of the body
(d) weight of the body

- 10 A firefighting airplane dropped its load into a firing forest when it was flying horizontally at a constant velocity and continued its motion by the same velocity, so the momentum of the airplane after dropping the load would

(a) increase (b) decrease (c) remain unchanged (d) become zero

- 11 In the opposite figure, two cars (1) and (2) are moving in a straight road and have the same momentum, so the mass of car (2) equals

(a) 10^5 kg (b) 10^4 kg
(c) 5×10^3 kg (d) 2.5×10^3 kg



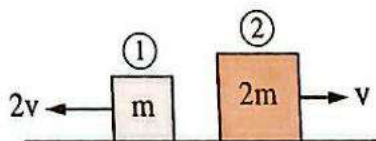
- 12 A bowling ball of mass 4.6 kg is moving at velocity v along a bowling alley, so at what uniform velocity does a gulf ball of mass 46 g move so that it has the same magnitude of momentum as that of the bowling ball?

(a) $0.01v$ (b) $5v$ (c) $10v$ (d) $100v$

- 13 * An eagle of mass 10 kg flies at a velocity of 20 m/s, if it catches a prey of mass 1 kg and then flies with it at the same velocity, the ratio between the momentum of the eagle alone and its momentum with the prey respectively equals

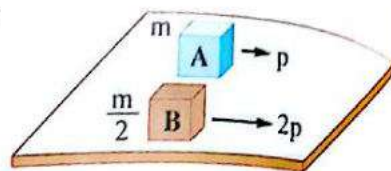
(a) $\frac{1}{1}$ (b) $\frac{1}{10}$ (c) $\frac{10}{11}$ (d) $\frac{10}{1}$

- 14 Two objects (1) and (2) of masses m and $2m$ respectively are moving in a straight line with velocities $2v$ and v respectively as in the opposite figure, so which of the following relations is correct concerning the momenta of the two objects?



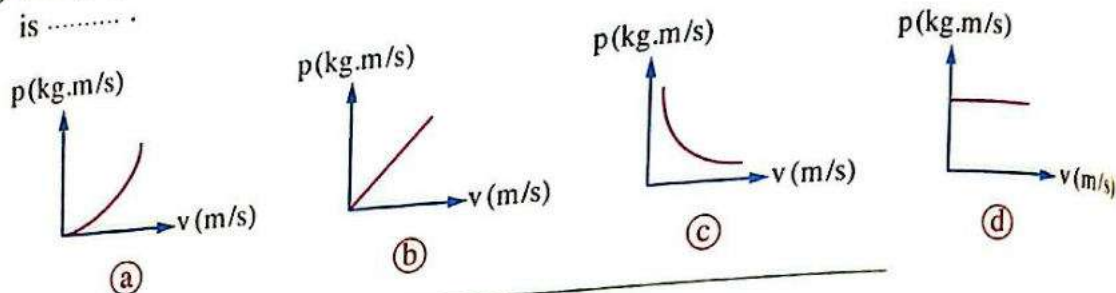
(a) $\vec{p}_1 = \vec{p}_2$ (b) $\vec{p}_1 = -\vec{p}_2$ (c) $\vec{p}_1 = \frac{1}{2}\vec{p}_2$ (d) $\vec{p}_1 = -2\vec{p}_2$

- 15 In the opposite figure, if body A has mass m , velocity v and momentum p while body B has mass $\frac{m}{2}$ and momentum $2p$, the velocity of body B is

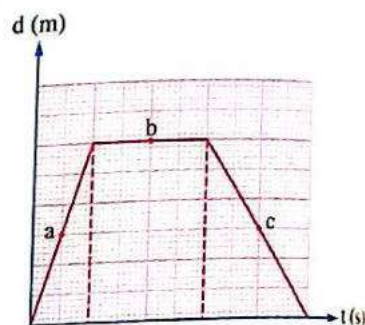


- (a) $\frac{v}{2}$ (b) v (c) $2v$ (d) $4v$

- 16 The graph that represents the relation between the momentum of a body and its velocity is

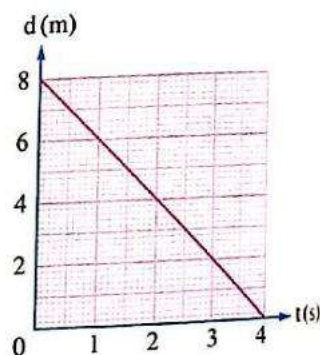


- 17 The opposite graph represents the variation of the displacement (d) of a body that is moving in a straight line versus time (t), so at which of the shown points in the graph the body has its maximum momentum?



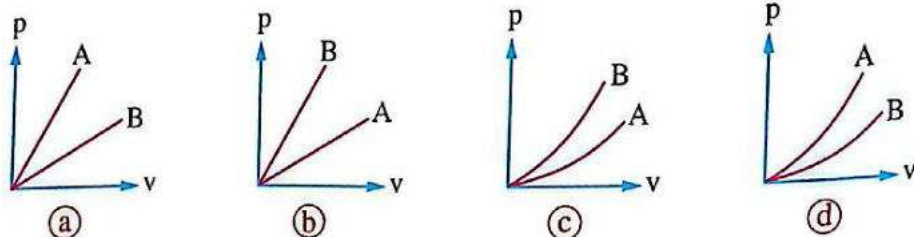
- (a) a (b) b (c) c (d) All points have equal momenta.

- 18 The opposite graph represents the relation between the displacement (d) and the time (t) for a body of mass 4 kg which is moving in a straight line, hence the magnitude of the momentum of the body through this time interval equals



- (a) 8 kg.m/s (b) 4 kg.m/s (c) 2 kg.m/s (d) 1 kg.m/s

- 19 Two bodies A and B of masses m and $3m$ respectively are moving in the same direction with a uniform acceleration, which of the following graphs represents the relation between the momentum (p) and velocity (v) for both bodies?



Newton's second law

- 20 The quotient of the net force that affects a body and the time rate of change in its velocity equals
- (a) the momentum of the body (b) the mass of the body
(c) the energy of the body (d) the acceleration of the body
-
- 21 The unit that is equivalent to kg.m.s^{-1} is
- (a) N (b) N.s^2 (c) N/s (d) N.s
-
- 22 When a constant net force acts on a static object that has a constant mass, the object
- (a) remains static (b) moves with a constant velocity
(c) moves with a constant acceleration (d) moves with an increasing acceleration
-
- 23 A car of mass 1000 kg is moving with a constant velocity of 20 m/s, hence the net force that acts on the car equals
- (a) 2×10^4 N (b) 50 N (c) 0.02 N (d) 0
-
- 24 If a net force of 2 N acts on a body of mass 0.5 kg, the body moves with an acceleration of
- (a) 0.25 m/s^2 (b) 1 m/s^2 (c) 2.5 m/s^2 (d) 4 m/s^2
-
- 25 A net force of 500 N affects a static body through an interval of time t , hence the body's momentum becomes 250 kg.m/s , then t equals
- (a) 0.1 s (b) 0.2 s (c) 0.5 s (d) 2 s
-
- 26 * When two equal forces affect two different masses ($m_1 = 5 \text{ kg}$ and $m_2 = 1 \text{ kg}$), mass m_1 acquires an acceleration of magnitude a_1 and mass m_2 acquires an acceleration of magnitude 20 m/s^2 , hence a_1 equals
- (a) 0.25 m/s^2 (b) 4 m/s^2 (c) 20 m/s^2 (d) 100 m/s^2
-
- 27 * A car of mass 900 kg was moving eastward with a velocity of 20 m/s on a straight road. The driver used the brakes so that the car slowed down with a constant acceleration of magnitude 5 m/s^2 , hence the magnitude of the frictional forces that affect the car equals
- (a) $18 \times 10^3 \text{ N}$ (b) 4500 N (c) 3600 N (d) 100 N

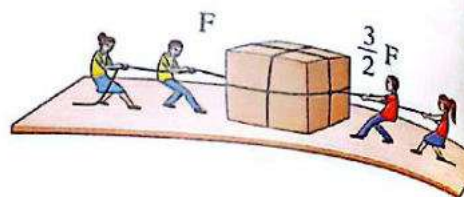
- 28 Two groups of students pull a box in two opposite directions as in the opposite figure.

So, the box has moved.

If the frictional force between the box and the ground's surface is $\frac{F}{4}$, the box will

move

- (a) to the left with constant velocity (b) to the left with constant acceleration
(c) to the right with constant velocity (d) to the right with constant acceleration



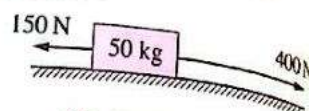
- 29 * In the opposite figure:

(i) The net force that acts on the body is

- (a) 550 N (b) 400 N (c) 250 N (d) 150 N

(ii) The acceleration of the body is

- (a) 1 m/s^2 (b) 2 m/s^2 (c) 4 m/s^2 (d) 5 m/s^2



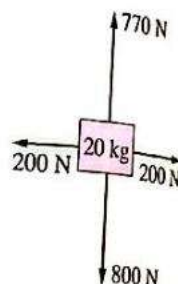
- 30 * In the opposite figure:

(i) The magnitude of the net force that acts on the body equals

- (a) 1570 N (b) 1370 N
(c) 200 N (d) 30 N

(ii) The magnitude of the acceleration of the body is

- (a) 1.5 m/s^2 (b) 9.8 m/s^2
(c) 10 m/s^2 (d) 78.5 m/s^2



- 31 * A vehicle of mass 1500 kg has started its motion from rest on a horizontal road under the action of both of its engine force whose magnitude is 9570 N and the frictional force whose magnitude is 8820 N, so:

(i) The net force that moves the vehicle equals

- (a) $18.39 \times 10^3 \text{ N}$ (b) 750 N (c) 650 N (d) 500 N

(ii) The acceleration with which the vehicle moves equals

- (a) 24.52 m/s^2 (b) 6.38 m/s^2 (c) 2 m/s^2 (d) 0.5 m/s^2

- 32 The ratio between the acceleration with which a body of mass 2 kg is moving to that with which a body of mass 4 kg is moving when both of them move under the action of equal net forces is

- (a) $\frac{1}{4}$ (b) $\frac{4}{1}$ (c) $\frac{1}{2}$ (d) $\frac{2}{1}$

- 33 * Two equal net forces act on two different masses. The first mass that is 5 kg acquires an acceleration of 8 m/s^2 , if the velocity of the second mass has changed from rest to 48 m/s through a time interval of 3 s, the second mass equals

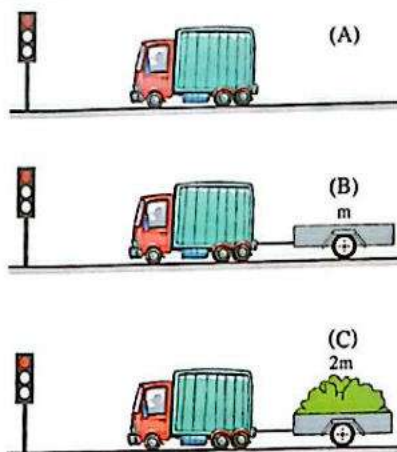
(a) 0.4 kg (b) 2.5 kg (c) 5 kg (d) 7.5 kg

- 34 * If a body of mass m has started to move from rest with a constant acceleration a till its momentum becomes p through a time interval t , so after an interval of time $2t$ from the beginning of the motion the momentum of the body becomes

(a) $4p$ (b) $2p$ (c) p (d) $\frac{p}{4}$

- 35 The opposite figure shows three cases for a car of mass m stopping at traffic lights, hence the order of the three cases according to the maximum magnitude of acceleration with which the car can move in each case is

(a) $A < B < C$
 (b) $A > B > C$
 (c) $A = B = C$
 (d) $A = B > C$



- 36 A car airbag reduces the force with which the driver may hit the steering wheel by increasing

(a) the change in the momentum of the driver
 (b) the momentum of the driver
 (c) the time of change in the momentum of the driver
 (d) the velocity of the driver

- 37 * When a car of mass 1000 kg was moving with a velocity of 20 m/s , the driver applied the brakes, so if the car stopped 10 s later after the moment of applying the brakes;

(i) The magnitude of change in the momentum of the car through that time interval equals

(a) $2 \times 10^5 \text{ kg.m/s}$ (b) $2 \times 10^4 \text{ kg.m/s}$
 (c) 10^4 kg.m/s (d) $2 \times 10^3 \text{ kg.m/s}$

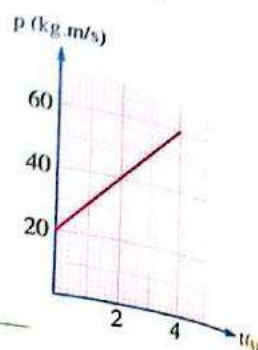
(ii) The magnitude of the net frictional force that affects the car equals

(a) $2 \times 10^3 \text{ N}$ (b) $5 \times 10^3 \text{ N}$
 (c) $2 \times 10^4 \text{ N}$ (d) 10^5 N

- 38 The driver of a car that was moving east in a straight line has applied the brakes to slow the car down uniformly, then direction of the momentum of the car and the net force that acted on it after applying the brakes respectively would be
- (a) east, east (b) west, west (c) east, west (d) west, east

- 39 The opposite figure represents the graph of momentum (p) versus time (t) for a body that moves in a straight line on a horizontal frictionless surface under the action of a constant force (F), then the acting force (F) on the body equals

- (a) 6 N (b) 10 N
(c) 15 N (d) 18 N



- 40 * The opposite graph represents the relation between the momentum of a body and the time, so the net force that acts on the body is

- (a) equal to zero
(b) in the same direction of motion
(c) in the opposite direction of motion
(d) perpendicular to the direction of motion



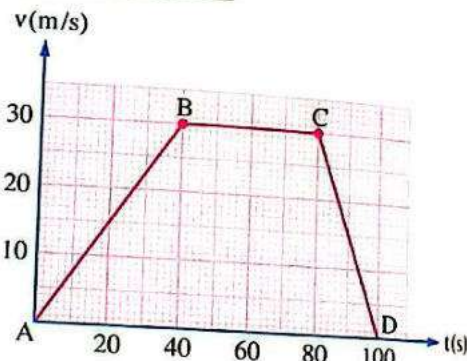
- 41 The opposite graph represents the relation between the speed (v) for a body of mass 80 kg moving in a straight line and the time (t), so:

- (i) The momentum of the body through the stage AB

- (a) increases (b) decreases
(c) is constant (d) is indeterminable

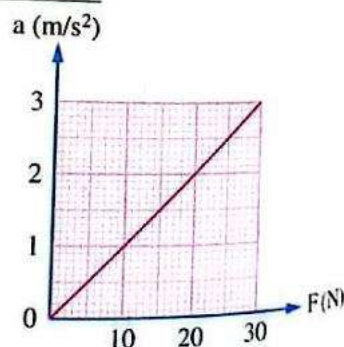
- (ii) The value of the acting forces during the stages BC and CD respectively are

- (a) 0, 0 (b) 0, 24 N (c) 600 N, 120 N (d) 0, 120 N

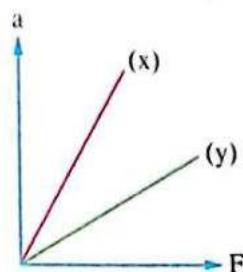


- 42 A body of mass m gets affected by a variable force (F), so the acceleration (a) of the body has changed as shown in the opposite graph, hence the mass (m) of the body equals

- (a) 0.01 kg (b) 0.1 kg
(c) 10 kg (d) 100 kg

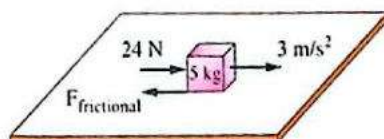


- 43 The opposite graph represents the relationship between the acceleration (a) with which two bodies (X) and (Y) move, and the force (F) acting on each of them, which of the two bodies has a greater mass?



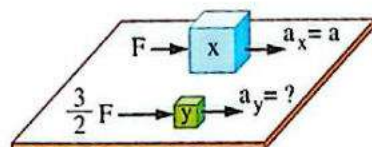
- (a) Body (X). (b) Body (Y).
(c) The two bodies have equal mass.
(d) The data is not enough to determine the answer.

- 44 From the opposite diagram, the magnitude of the frictional force equals



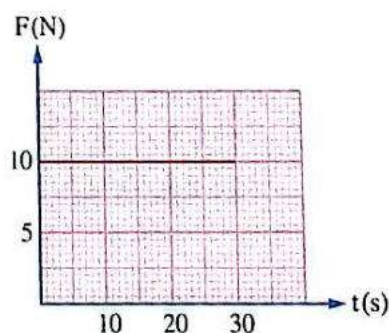
- (a) 6 N (b) 8 N
(c) 9 N (d) 39 N

- 45 The opposite figure represents a body x of mass m that is affected by a net force F to acquire a constant acceleration a , so if another body y of mass $\frac{1}{2}m$ is affected by a net force $\frac{3}{2}F$, it will acquire a constant acceleration of



- (a) $\frac{1}{3}a$ (b) $\frac{3}{2}a$ (c) $3a$ (d) $6a$

- 46 The opposite graph represents the relation between the net force (F) that affects a static body and the time (t). If the velocity of the body after 20 s has elapsed from the beginning of the motion becomes 2 m/s, so:



- (i) The change in the momentum of the body after the elapsing of the 20 s equals

- (a) 0.5 kg.m/s (b) 2 kg.m/s
(c) 200 kg.m/s (d) 250 kg.m/s

- (ii) The mass of the body equals

- (a) 0.25 kg (b) 1 kg (c) 100 kg (d) 125 kg

- 47 * A car of mass 725 kg was moving with 72 km/h. When the driver of the car has pressed the brakes for 2 s, the car gets affected by a frictional force of magnitude 2×10^3 N, so:

- (i) The change in the momentum of the car through this interval equals

- (a) 10^3 kg.m/s (b) 4×10^3 kg.m/s (c) -10^3 kg.m/s (d) -4×10^3 kg.m/s

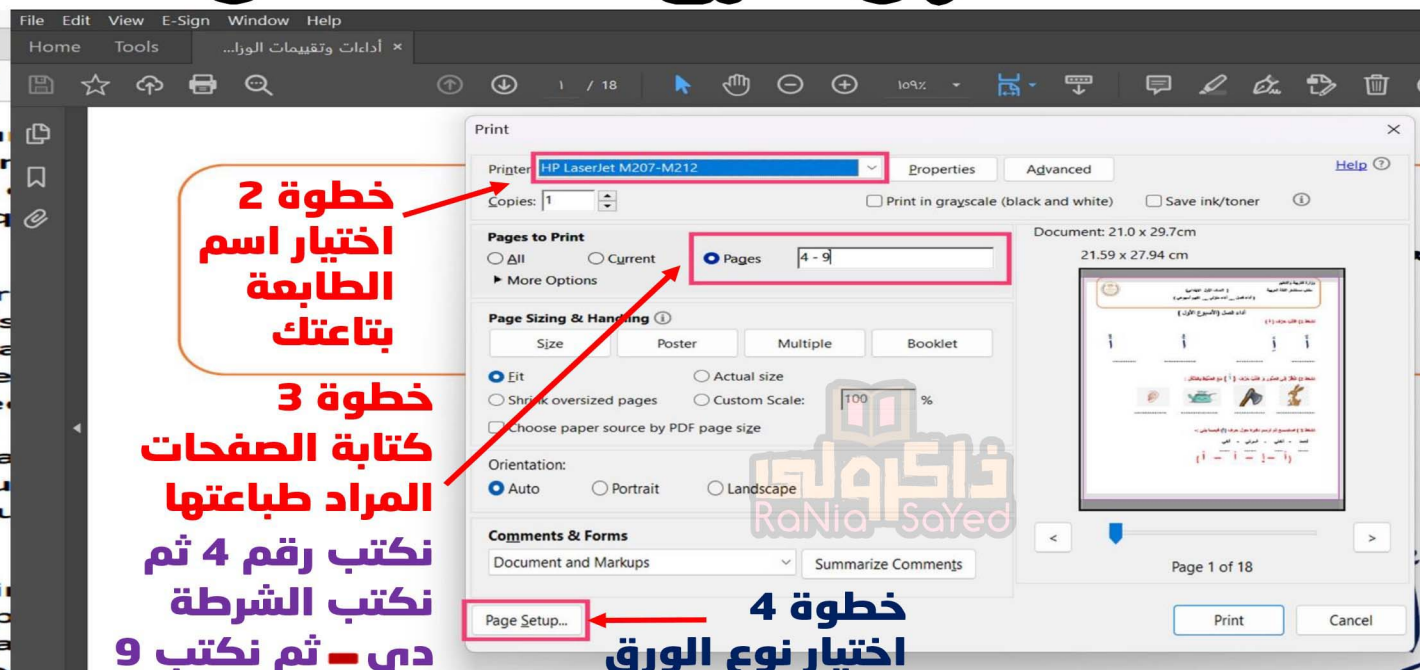
- (ii) The velocity of the car directly after the force of the brakes has vanished equals

- (a) 77.52 m/s (b) 25.52 m/s (c) 14.48 m/s (d) 8.96 m/s

كيفية طباعة صفحات معينة من ملف معين مثلا ازاي نطبع الصفحات من صفحة 4 الى صفحة 9



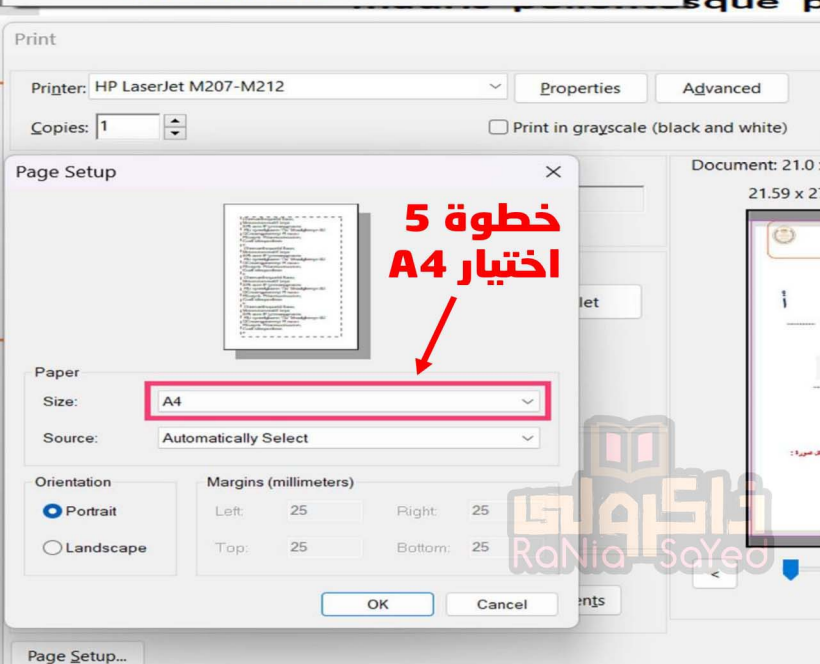
خطوة 1



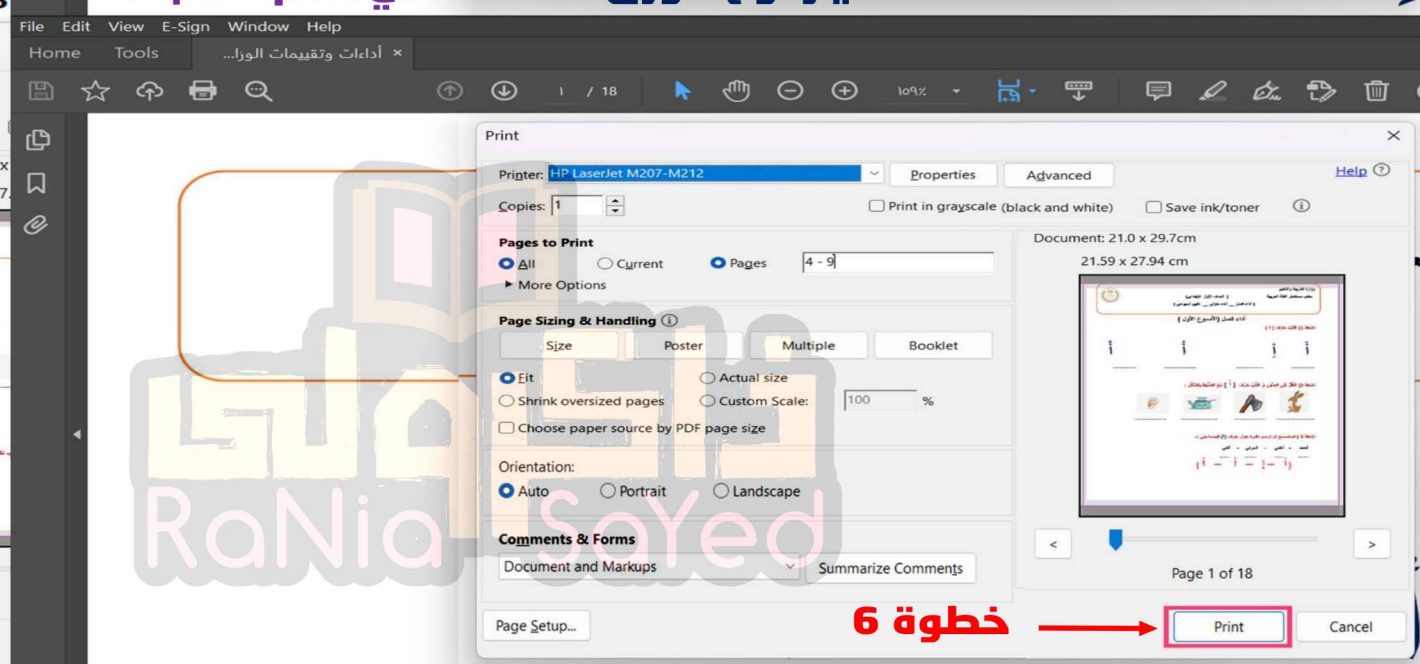
خطوة 2
اختيار اسم
الطابعة
بتاعتك

خطوة 3
كتابة الصفحات
المراد طباعتها
نكتب رقم 4 ثم
نكتب الشرطة
دي - ثم نكتب 9

خطوة 4
اختيار نوع الورق



خطوة 5
اختيار A4



خطوة 6

حمل الآن

مجاناً وحصرياً

المراجعة رقم (2)

اختبار شهر اكتوبر



UNIT (1) CHAPTER (1) PHYSICAL MEASUREMENTS

MEASUREMENT PROCESS:

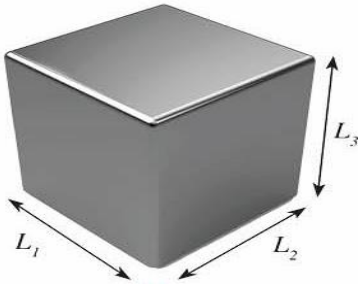
Process of comparing an unknown quantity with another quantity of its kind to find out how many times the first includes the second.

Key elements of measurement process:

- 1- Physical quantity.
- 2- Measuring tools.
- 3- Measuring units.



Physical quantity

Fundamental quantities	Derived quantities
Can't be defined in terms of other physical quantities.	Can be defined in terms of the fundamental physical quantities.
Ex: Mass (m), Length (L) and Time (t)	Ex: Volume, speed area and density. 

Measuring tools

-In ancient times: Human used parts of his body like : hand span ,arm and foot to **measure length**.

-Sunrise ,sunset and Moon phases to measure **time**.

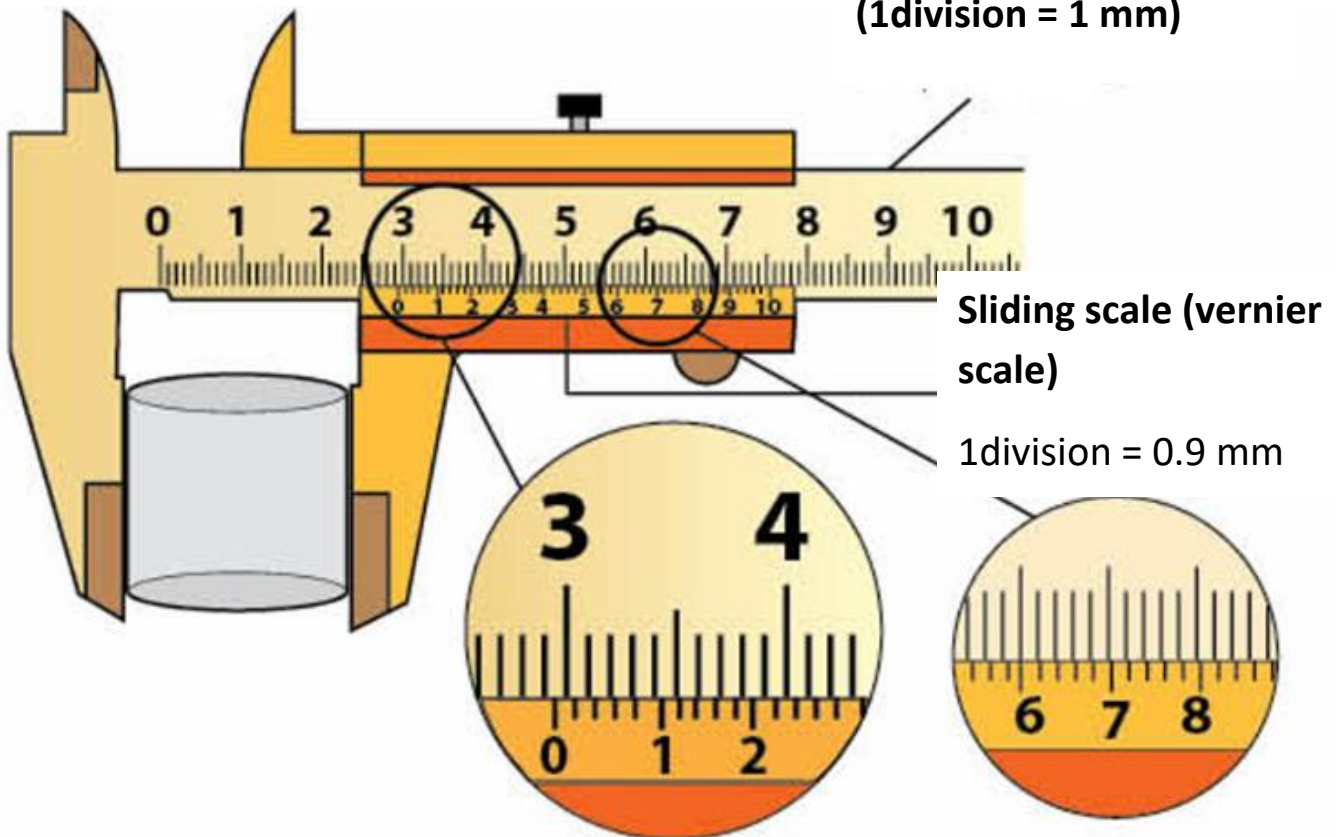


Length	Mass	Time
1- Meter Tape. 2- Vernier Caliper. 3- Ruler. 4- Micrometer.	1- Roman Scale. 2- Two pan Scale. 3- One pan Balance. 4- Digital Balance.	1- Hourglass. 2- Stopwatch. 3- Pendulum clock. 4- Digital Watch.
 	  	   

Structure of vernier caliper

Fixed Scale

(1 division = 1 mm)



-In the opposite figure what's the diameter of this cylinder?

How it is used

1. The object is placed between the two jaws of the caliper and gently pressed.
2. The length of the object is determined from the relation :

$$\text{The length} = X + x$$

Where: (X) is the reading on the **fixed scale** which is recorded before the zero mark of the vernier scale.

(x) is the **vernier reading** which is determined by finding out the mark on the vernier scale that perfectly lines up with one of the marks on the fixed scale and multiplying it by the difference between the divisions on the fixed scale and the divisions on the vernier scale (i.e., multiplying it by 0.1 mm).

Measuring units

	The French system (C.G.S)	The British System (F.P.S)	The Metric System (M.K.S)
Length	Centimeter (cm)	Foot(ft)	Meter (m)
Mass	Gram(g)	Pound (lb)	Kilogram(Kg)
Time	Second(s)	Second(s)	Second(s)

(International System of units) SI units

The Physical Quantity	The international Units
Length(L)	Meter(m)
Mass(M)	Kilogram(kg)
Time(t)	Second(s)
Electric current intensity(I)	Ampere(A)
The absolute temperature(T)	Kelvin(k)
Amount of material (n)	Mole(mol.)
Luminous intensity (I_v)	Candela(cd)
Angle measurement	Radian
Solid angle measure	Steradian

Standard units

Standard

(Length) meter

It is the distance between two engraved marks at the ends of a rod made of Platinum and Iridium alloy kept at 0°C, at the international bureau of weights and measures near Paris.



The Standard Mass

(Kilogram)

It is the mass of a cylinder made of Platinum and Iridium alloy of specific dimension kept at 0°C, at the international bureau of weights and measures near Paris.



The Standard Time (Second)

The Second = $\frac{1}{86400}$ of the average solar day.

Note: Platinum Iridium used in making standard units:

Bec. Its rigid, chemically inactive and doesn't affect the surrounding temperature.

-Scientists use atomic clocks like: **Cesium clock** because of its high accuracy.

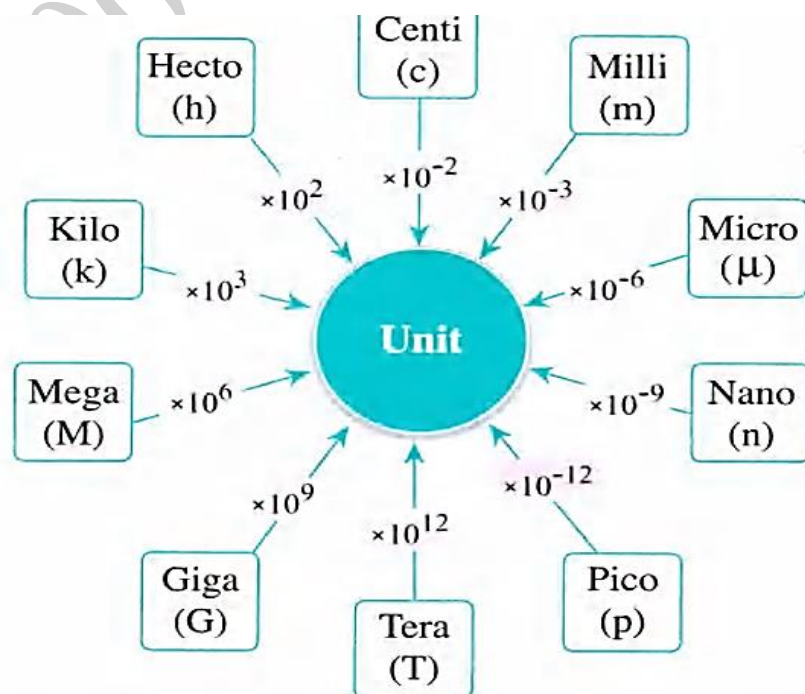
It used for :

- 1-Determine the duration of The Earth spin (day length).
- 2- Tuning up the clock used for aviation and navigations.
- 3-Synchronizing the devices used in space ships.



The cesium atomic clock

Prefixes



Example 1

A car moved a distance of 5 km, so this distance is equivalent to

- (a) 5×10^{-5} cm (b) 5×10^{-2} cm (c) 5×10^2 cm (d) 5×10^5 cm

Solution

$$s = 5 \text{ km} = 5 \times 10^3 \text{ m} = 5 \times 10^3 \times 10^2 \text{ cm} = 5 \times 10^5 \text{ cm}$$

∴ The correct choice is (d).

Example 2

The length of a particle was measured using an instrument, it was found to be $3 \mu\text{m}$, so the length of the particle equals

- (a) 3×10^9 km (b) 3×10^3 km (c) 3×10^{-3} km (d) 3×10^{-9} km

Solution

$$l = 3 \mu\text{m} = 3 \times 10^{-6} \text{ m} = 3 \times 10^{-6} \times 10^{-3} \text{ km} = 3 \times 10^{-9} \text{ km}$$

∴ The correct choice is (d).

The Star of Africa diamond is the largest cut diamond in the world and it is kept in the tower of London. If the volume of this diamond is 30.2 cm^3 , then its volume in m^3 equals

- (a) 30.2×10^3 (b) 30.2×10^{-2}
(c) 30.2×10^{-6} (d) 30.2×10^{-9}

Solution

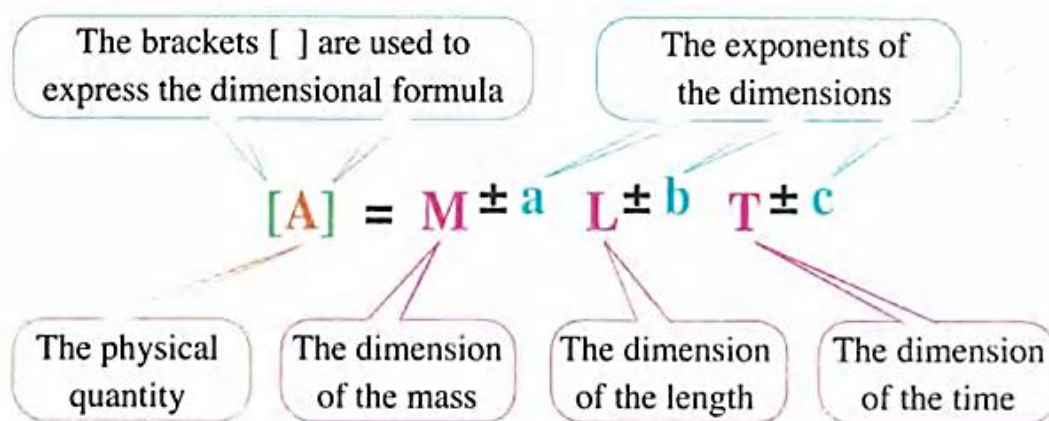
$$V = 30.2 \text{ cm}^3 = 30.2 \times (10^{-2} \text{ m})^3 = 30.2 \times 10^{-6} \text{ m}^3$$

∴ The correct choice is (c).



Dimensional formula

-Mass is denoted by **M**, length is denoted by **L** and time with **T**



⇒ The following table shows the dimensional formulae of some derived physical quantities and their measuring units:

The physical quantity	Its relationship to other quantities	The dimensional formula	Unit of measurement
Area (A)	$A = \text{Length} \times \text{Width}$	$[A] = L \times L = L^2$	m^2
Volume (V)	$V = \text{Length} \times \text{Width} \times \text{Height}$	$[V] = L \times L \times L = L^3$	m^3
Density (ρ)	$\rho = \frac{\text{Mass}}{\text{Volume}}$	$[\rho] = ML^{-3}$	kg.m^{-3}
Speed (v)	$v = \frac{\text{Distance}}{\text{Time}}$	$[v] = LT^{-1}$	m.s^{-1}
Acceleration (a)	$a = \frac{\text{Change of speed}}{\text{Time}}$	$[a] = LT^{-2}$	m.s^{-2}
Force (F)	$F = \text{Mass} \times \text{Acceleration}$	$[F] = M \times LT^{-2} = MLT^{-2}$	kg.m.s^{-2}
Momentum (P_L)	$P_L = \text{Mass} \times \text{Speed}$	$[P_L] = MLT^{-1}$	kg.m.s^{-1}
Work (W)	$W = \text{Force} \times \text{Displacement}$	$[W] = ML^2T^{-2}$	$\text{kg.m}^2.\text{s}^{-2}$

If the acceleration is defined as the time rate of change of speed, then the dimensions of acceleration (a) and its measuring unit are

	Dimensions	Measuring unit
(a)	LT^{-1}	$m.s^{-1}$
(b)	LT^{-1}	$m.s^{-2}$
(c)	LT^{-2}	$m.s^{-1}$
(d)	LT^{-2}	$m.s^{-2}$

Solution

$$\text{Acceleration} = \frac{\text{Change of speed}}{\text{Time}} = \frac{\text{Distance / Time}}{\text{Time}}$$

$$\therefore [a] = \frac{L/T}{T} = \frac{LT^{-1}}{T} = LT^{-2}$$

$\therefore$ The measuring unit of acceleration is $m.s^{-2}$.

From the following equation: $x = C_1 t + C_2$, the measuring unit of the quantity C_1 is (Where: (x) is the distance in meters and (t) is the time in seconds)

(a) m

(b) m.s

(c) m/s

(d) s/m

Solution

Clue

We can obtain the dimensions of the quantity C_1 by equalizing the dimensions of the two sides of the equation and taking into consideration that the dimensional formula doesn't be added.

$$\therefore [x] = [C_1 t] = L$$

$$\therefore L = [C_1] T \quad \therefore [C_1] = \frac{L}{T} = LT^{-1}$$

$\therefore$ The measuring unit of C_1 is meter/second (m/s).

$\therefore$ The correct choice is (c).

If the pressure is the division of the force by area, find the dimensions of the pressure.
(Knowing that: Force (F) = Mass (m) $\times$ Acceleration (a), $[a] = LT^{-2}$)

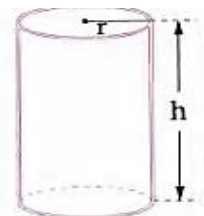
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-The Dimensional formula used to verify the validity of a physical relation.

For a cylinder of base radius r , height h and volume V , which of the following relations may be correct?

- (a) $V = \pi r h$ (b) $V = \pi r^2 h$ (c) $V = \pi \frac{r}{h}$ (d) $V = 2 \pi \frac{h^2}{r}$



Solution

* The relation is possible when the dimensions of the sides of the equation are equal.

$\therefore$ The dimensions of the L.H.S: $[V] = L^3$

$\therefore$ The dimensions of the R.H.S must equal L^3

The dimensions of the R.H.S

(a) $[\pi r h] = L L = L^2$ ☒	(b) $[\pi r^2 h] = L^2 L = L^3$ ☒	(c) $[\pi \frac{r}{h}] = \frac{L}{L} = L^0$ ☒	(d) $[2 \pi \frac{h^2}{r}] = \frac{L^2}{L} = L$ ☒
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A body moves under the effect of the acceleration due to gravity (g) where its speed gets changed from v_i to v_f during time t , so which of the following relations could be correct?

(Knowing that: $[g] = L T^{-2}$, $[v] = L T^{-1}$)

- (a) $v_f = v_i + gt$ (b) $v_f = v_i t + gt$ (c) $v_f = v_i + gt^2$ (d) $v_f = v_i t + gt^2$

Solution

* The relation is possible when the dimensions of all the sides of the equation are equal.

$\therefore$ The dimensions of the L.H.S: $[v_f] = L T^{-1}$

$\therefore$ The dimensions of the R.H.S must equal $L T^{-1}$

The dimensions of the R.H.S

(a) $[v_i] = L T^{-1}$ ☒	(b) $[v_i t] = L T^{-1} T = L$ ☒	(c) $[v_i] = L T^{-1}$ ☒	(d) $[v_i t] = L T^{-1} T = L$ ☒
$[gt] = L T^{-2} T = L T^{-1}$	$[gt] = L T^{-2} T = L T^{-1}$	$[gt^2] = L T^{-2} T^2 = L$	$[gt^2] = L T^{-2} T^2 = L$

Measurement Error

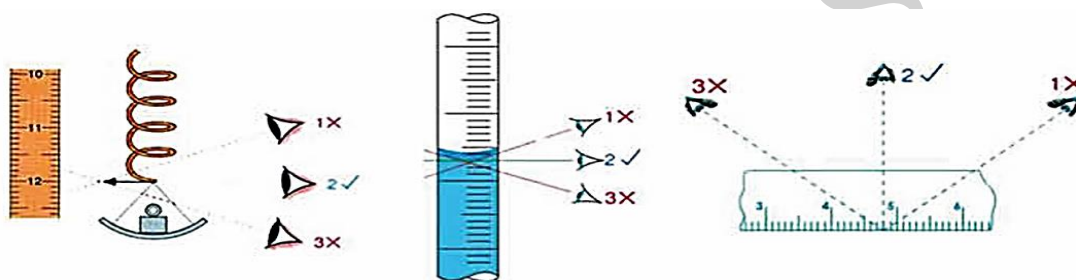
-Reasons (sources) of measurement error, such as:

1- Choosing an improper tool.

2- A defect in the measuring tool as the defects that may be in ammeter.



3- Wrong procedure due to the lack of experience of persons.



4- Environmental conditions, for example : temperature ,humidity, Air currents.



Types of measurement

Direct Measurement	Indirect Measurement
One measuring tool is used.	More than one measuring tool are used.
No mathematical relation is applied.	A mathematical relation is applied to find the quantity.
One measurement error may occur.	More than one measurement error may occur.
Like measure the density by using hydrometer.	Like measure the density by measure the mass and volume.



Dr. Ahmed Zewail

He won Nobel prize in 1999 for using a laser camera to study the mechanisms of chemical reactions between molecules that take place in a very short time estimated by femto -seconds (10^{-15} s)

Lord kelvin (William Thomson)

British scientist ,He is considered one of the most prominent scientists who developed the metric system ,He determined absolute zero on the Kelvin scale of temperatures with complete accuracy and found that it is equal to (-273 °C)



Unit (2) Linear motion
Ch.2 Motion in Straight line

Motion: Change in a position or location of an object as time passes relative to another static object.

-Simplest type of motion is motion in **straight line**, (Ex : motion of train)

Types of motion

Translational motion	Periodic motion
The motion which has starting point and end point.	The motion that repeats itself in equal interval of time.
Motion in straight line. Motion of projectiles (in curved path)	Motion in circle. Vibrational motion

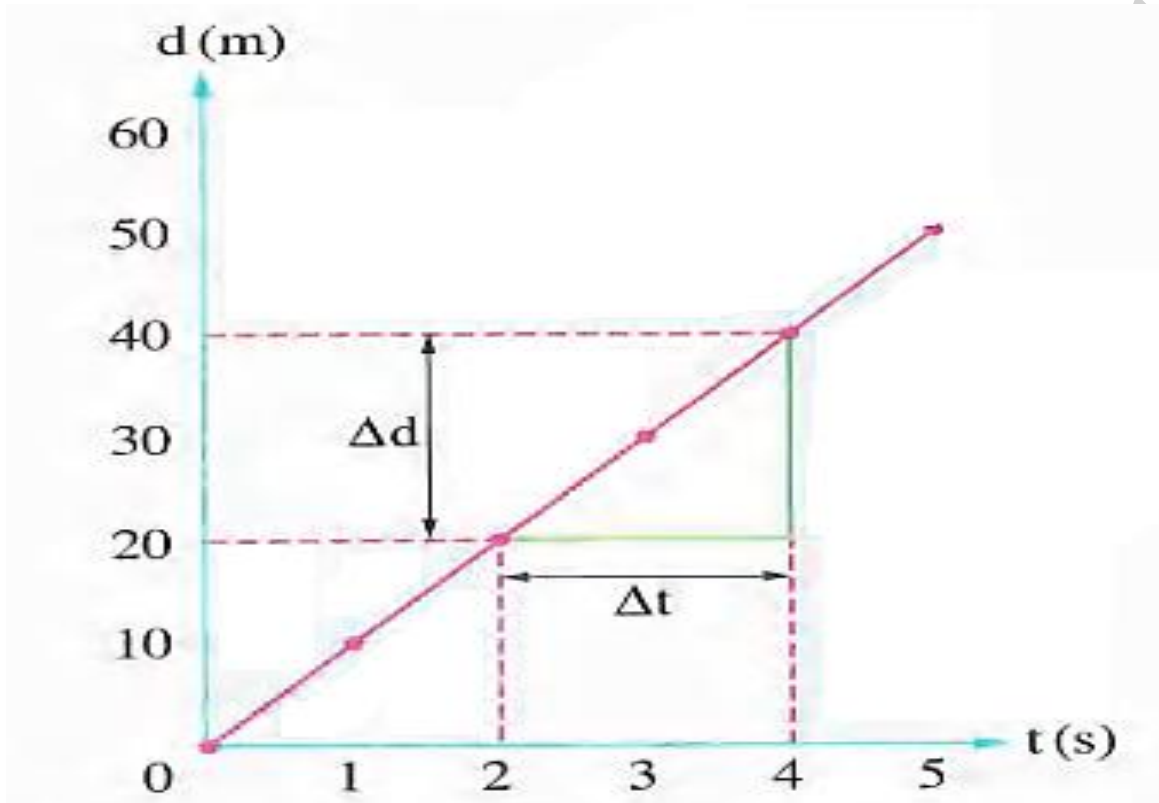
Velocity: The rate of change of displacement or displacement that covers in one second.

Measuring unit: m/sec or Km/h

To convert from m/sec to Km /h (divided by 5/18)

Graphical representation between time and displacement

-It represents by (displacement on y -axis and time on x- axis) the slope = velocity.

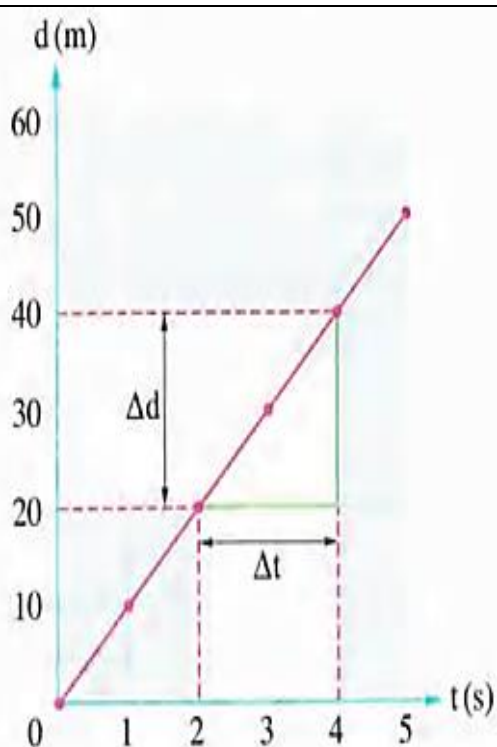


Velocity	Speed
The displacement of an object in one second.	The distance of an object in one second.
Vector quantity (defined by magnitude and direction)	Scalar quantity (defined by magnitude only)
Its sign may be positive or negative.	Always has positive sign.

Types of velocity

Uniform velocity

At which the objects move through equal displacements in equal interval of time.

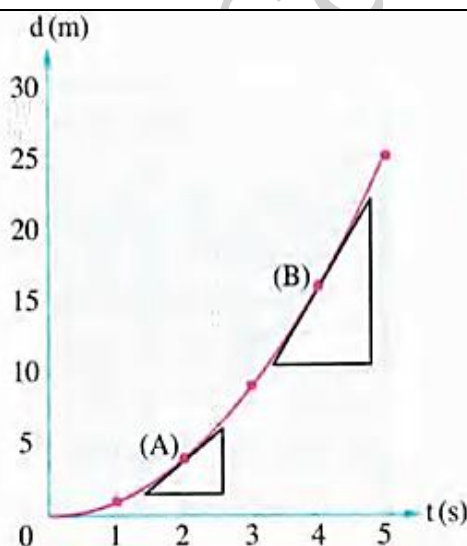


The slope of the straight line gives the magnitude of the uniform velocity at which the object moves:

$$\text{Slope} = v = \frac{\Delta d}{\Delta t} = \frac{40 - 20}{4 - 2} = 10 \text{ m/s}$$

Non uniform velocity

At which the objects move through unequal displacements in equal interval of time, or (equal displacement in unequal intervals of time.)



The slope of the tangent drawn to the curve at any point gives the magnitude of the instantaneous velocity of the object at this point:

- The velocity of the car at $t = 2 \text{ s}$

$$\text{Slope at (A)} = v_A = \frac{\Delta d_1}{\Delta t_1} = \frac{6.1 - 1.5}{2.6 - 1.45} = 4 \text{ m/s}$$

- The velocity of the car at $t = 4 \text{ s}$

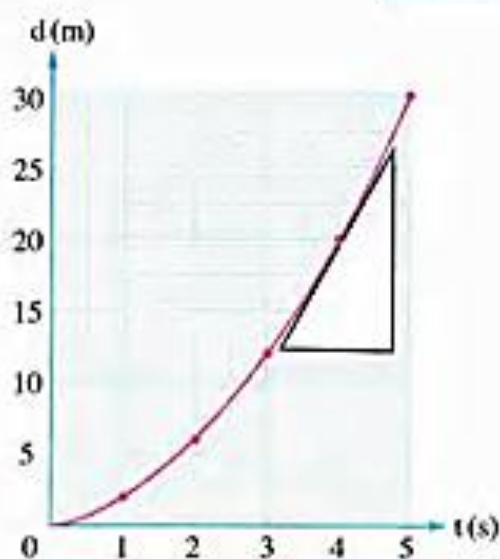
$$\begin{aligned} \text{Slope at (B)} &= v_B = \frac{\Delta d_2}{\Delta t_2} \\ &= \frac{22 - 10.4}{4.8 - 3.35} = 8 \text{ m/s} \end{aligned}$$

Instantaneous velocity (v)

The velocity of the object at a given instant and it is defined by the time rate of change in displacement through a time interval that approaches zero.

The mathematical relation

It is determined from the slope of the tangent of the (displacement-time) curve at a certain instant.



The instantaneous velocity of an object at an instant is given by the slope of the tangent drawn to the curve at the point corresponding to that instant.

$$\begin{aligned}\text{Slope of tangent} = v &= \frac{26.5 - 12.5}{4.8 - 3.2} \\ &= 8.75 \text{ m/s}\end{aligned}$$

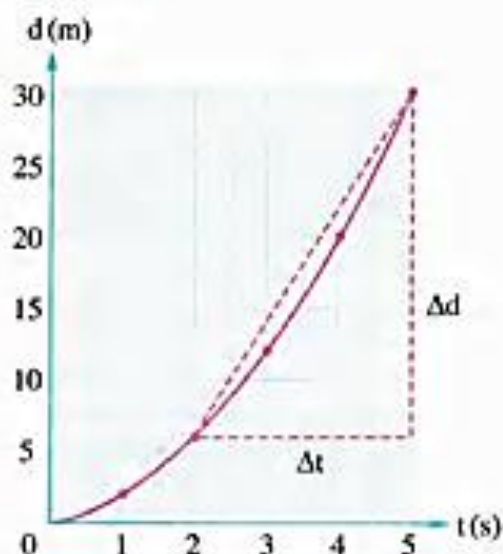
Which means that: The instantaneous velocity at $t = 4$ s is 8.75 m/s.

Average velocity ($\bar{v}$)

The total displacement of the object from the starting point to the end point of a definite time interval divided by that total time interval.

$$\bar{v} = \frac{d \text{ (Total displacement)}}{t \text{ (Total time)}}$$

Graphical representation



The average velocity of an object is given by the slope of the line joining the starting point and the end point of a certain interval of time.

$$\begin{aligned}\text{Slope of line} = \bar{v} &= \frac{\Delta d}{\Delta t} = \frac{30 - 6}{5 - 2} \\ &= 8 \text{ m/s}\end{aligned}$$

Which means that: The average velocity of the object from $t = 2$ s to $t = 5$ s is 8 m/s.

Acceleration

-If the velocity of an object changed from point to another either in magnitude or in direction, this change in velocity with time (rate of change of velocity) is known as acceleration and such motion is called **accelerated motion**.

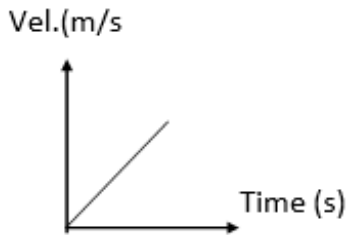
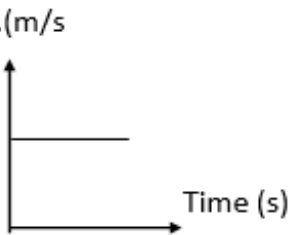
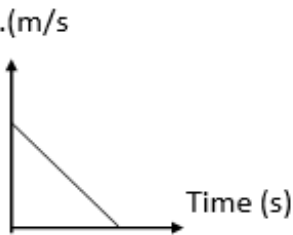
So, **acceleration** is the rate of change of velocity or change in velocity in one second.

Acceleration = Change in velocity/time of change
= final velocity – initial velocity / final time – initial time

- **Measuring unit** = m/s^2

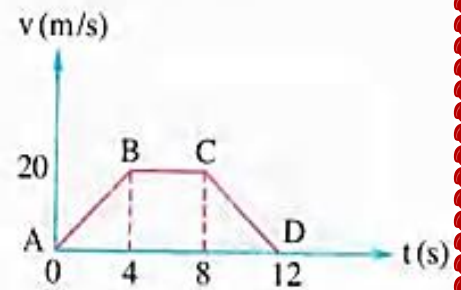
-**Dimensional formula** = LT^{-2}

Types of Acceleration

Positive acceleration.	Zero acceleration.	Negative acceleration.
When the velocity increase.	When the velocity is constant.	When the velocity decrease.
 Vel.(m/s) Time (s)	 Vel.(m/s) Time (s)	 Vel.(m/s) Time (s)

From the opposite graph:

- (a) Describe the type of motion by which the body moves within 12 s.
- (b) Calculate the acceleration in each interval.
- (c) Calculate the distance covered by the body during the interval BC.



Solution:

A -During the first 4 sec. the body is moving with positive uniform acceleration.

-During next 4 sec. the body is moving in uniform velocity (zero acceleration.)

-During the last 4 s the body is moving with a uniform acceleration (negative acceleration).

B-From A to B:

$$a = \text{change in velocity} / \text{change in time} = 20-0/4-0 = 5 \text{ m/s}^2$$

-From B To C:

$$a = \text{zero}$$

-From C to D:

$$a = 0-20/12-8 = -20/4 = -5 \text{ m/s}^2$$

c) The area under the curve during this time interval =

$$= 20 \times (8-4) = 80 \text{ m}$$

Ch.3 Motion and force

Force: External influence that affects the object to change its state of motion or direction.

-Appreciation to Galileo and Newton for their contribution in formulating a reliable theory of motion by the end of seventeenth century where they explored and explained the motion of bodies and its causes.



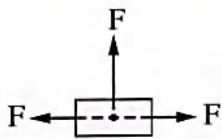
Newton's first law: A static object keeps its state of rest and a moving object keeps its state of motion at a uniform velocity in a straight line unless acted upon by a resultant force.

$$\Sigma F = 0$$

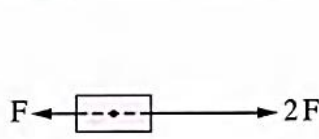
-So, if the force that affects an object = zero that means the velocity of the object doesn't change ($a = 0$)

Example

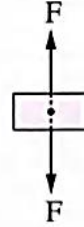
The following figures represent four static bodies, if they get affected by several forces as shown in the following figures, which one of these bodies remains static?



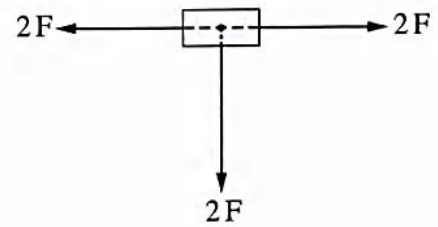
(a)



(b)



(c)



(d)

Inertia

It is the tendency of an object to keep either its state of rest or state of motion at its original velocity uniformly in a straight line.

Or: it is the property of objects to resist the change of its static or dynamic state.

When a bus moves forward suddenly from rest or when its velocity increases suddenly, the passengers tend to fall backward,



because the body (passengers) tends to keep its state of rest.

When the bus stops suddenly or when its velocity decreases suddenly, the passengers tend to fall forward,



because the body (passengers) tends to keep its state of motion.

Momentum: Mass x velocity , $P = m \times v$

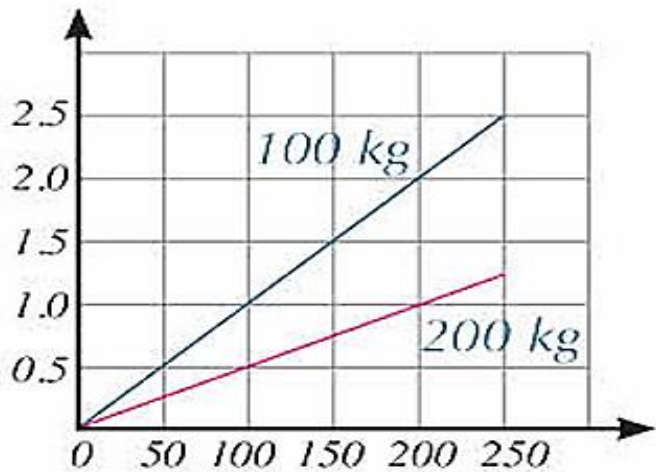
M.u = Kg.m/sec , **D.F = M L T⁻¹**

Newton's second Law: the total force that affect on an object equals the rate of change in momentum.

$$F = \frac{\Delta mv}{\Delta t} = \frac{mv_f - mv_i}{\Delta t} = m \frac{v_f - v_i}{\Delta t} = m \frac{\Delta v}{\Delta t}$$

$$F = m.a \quad , a = F/m$$

Acceleration



Force (N)

Newton: Measuring unit of force and it is defined as the force which is affected on an object whose mass of 1 kg gives it acceleration = 1 m/s²

$$1N = 1Kg .m /s^2$$

Notes:

A car crashing into a wall is more devastating than a pile of hay.

* If a person falls from a high place into water, they will not be hurt, but if they fall to the ground, they may be hurt.

The severity of the injury increases with the height from which the person falls.

* If an egg falls on a pillow, it will not break, but if it falls to the ground, it will break.



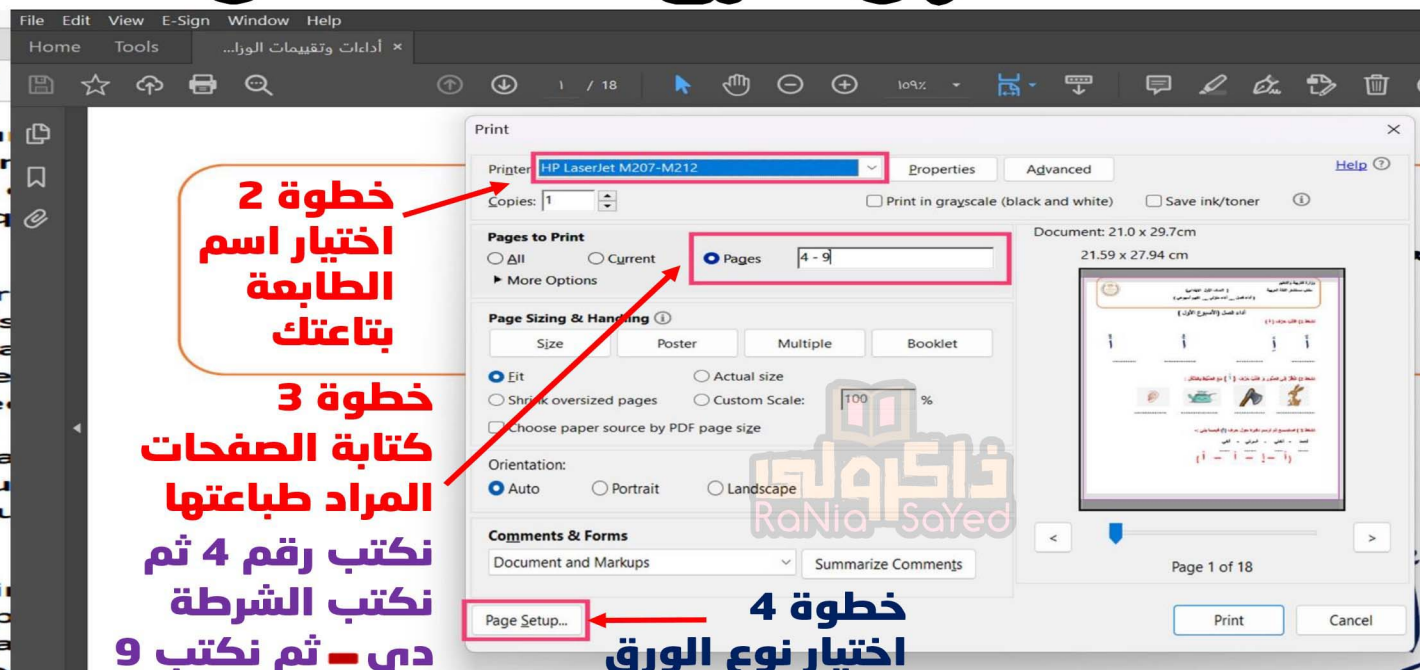
-Air bags used to keep the driver when car stops suddenly.

كيفية طباعة صفحات معينة من ملف معين

مثلا ازاي نطبع الصفحات من صفحة 4 الى صفحة 9



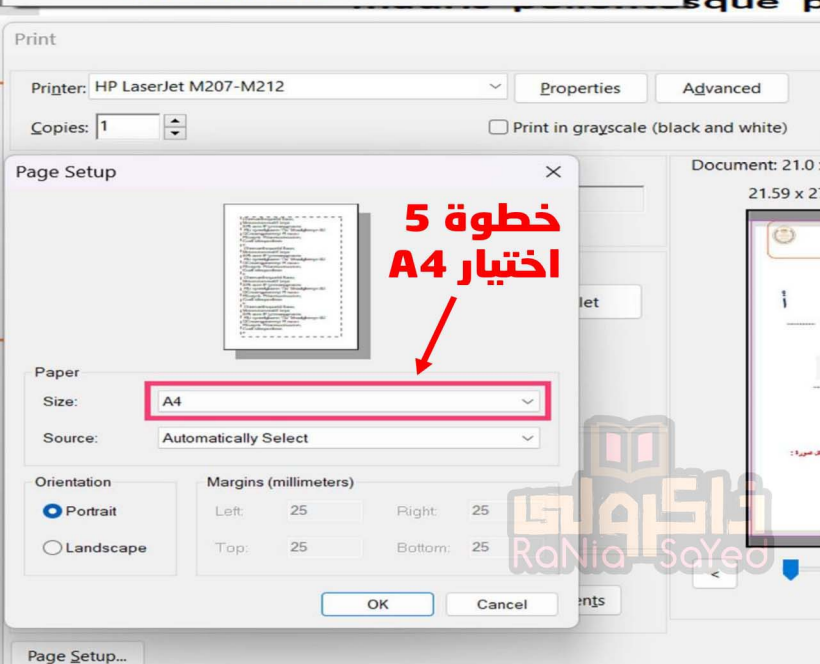
خطوة 1



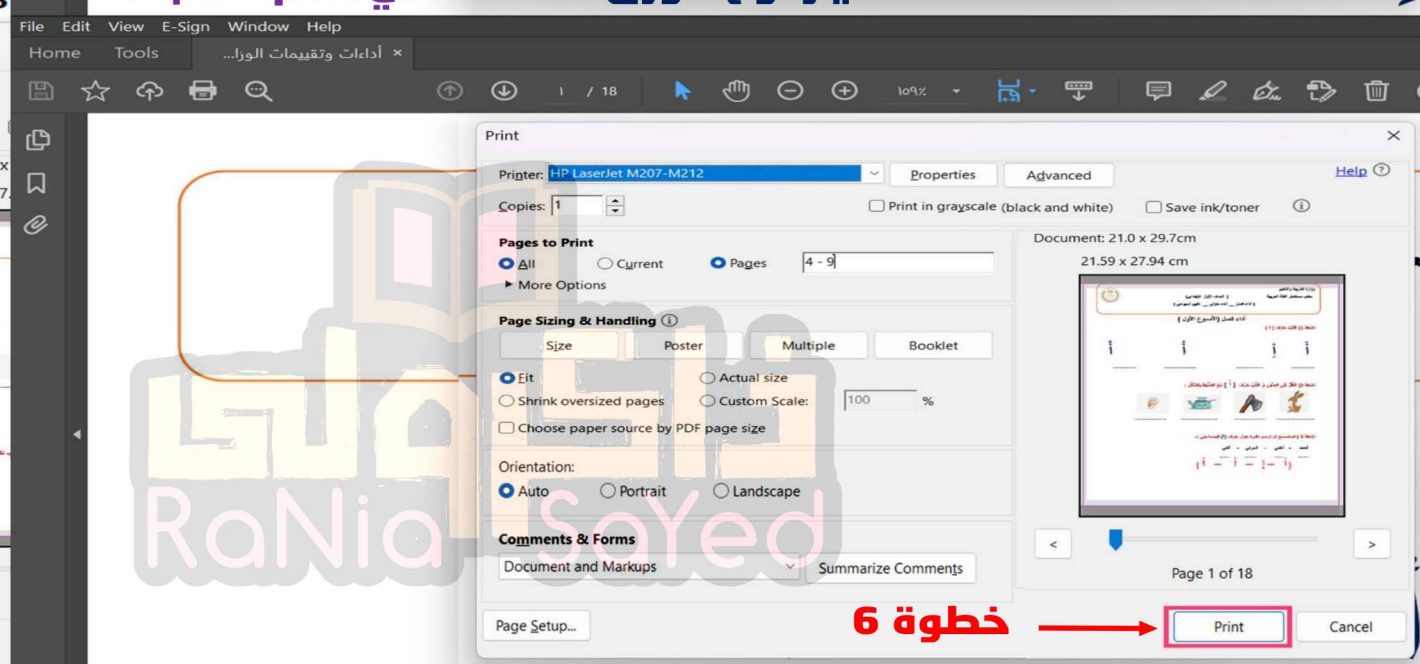
خطوة 2
اختيار اسم
الطابعة
بتاعتك

خطوة 3
كتابة الصفحات
المراد طباعتها
نكتب رقم 4 ثم
نكتب الشرطة
دي - ثم نكتب 9

خطوة 4
اختيار نوع الورق



خطوة 5
اختيار A4



خطوة 6